

# FMC Corporation

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April 27, 2006

Mr. Steven Becker, P.G., Chief  
Site Evaluation and Remediation Unit  
Department of Toxic Substances Control  
8800 Cal Center Drive  
Sacramento, California 95826

**RE: Revised Interim Action  
Removal Action Workplan for Soil  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California  
Voluntary Cleanup Agreement  
Docket No. HAS-A 02/03-003**

Dear Mr. Becker:

By the present letter and enclosed report, FMC Corporation (FMC) is submitting the *Revised Interim Action Removal Action Workplan for Soil, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California* (Revised Interim RAW), dated April 2006, to the State of California – Department of Toxic Substances Control (DTSC).


The Revised Interim RAW has been prepared in accordance with the agreements reached between FMC, DTSC and the California Regional Water Quality Control Board, Central Valley Region (RWQCB), during the February 7 and April 20, 2006 meetings to discuss the agencies' comments regarding the December 2005 *Feasibility Study for Soil and Groundwater and Removal Action Workplan for Soil, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California* (FS/RAW) and FMC's preliminary results modeling infiltration at the site. It was agreed that the Removal Action Workplan, included in the FS/RAW submittal as Section 12, would be revised to address DTSC's comments specific to that section and submitted as a stand-alone document. It was agreed at the April 20, 2006 meeting that the Interim RAW, initially submitted to the agencies on March 31, 2006, would be revised to include the following portions from the FS/RAW applicable to soils above health-based Site-specific target levels (SSTLs): applicable or relevant and appropriate requirements; remedial action objectives; and an evaluation of alternative remediation technologies. This Revised Interim RAW describes the process to excavated soils identified to exceed the health-based SSTLs defined in the health-based risk assessment (presented as the revised Appendix G in the Addendum to the Comprehensive Remedial Investigation Report, January 2005).



Mr. Steven Becker  
Department of Toxic Substances Control  
April 27, 2006  
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If you have any questions, or require additional information please call me at (408) 289-3141.

Sincerely,

A handwritten signature in black ink, appearing to read 'Z. M. Zadeh', enclosed within a large, loopy oval shape.

Zahra M. Zahiraleslamzadeh  
Manager, Remediation Projects  
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Corporate Environmental Group

Enclosure

cc: Department of Toxic Substances Control, Randy Adams  
Central Valley Regional Water Quality Control Board, Duncan Austin\*  
Central Valley Regional Water Quality Control Board, Marie McCrink  
Stanislaus County Health Services Agency, Mike Sonke  
City of Modesto Redevelopment Agency, Linda Boston

\* Cover letter only

***Revised Interim Action  
Remedial Action Workplan for Soil***

**FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California**


April 2006

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## ***List of Acronyms***

ARARs	Applicable or Relevant and Appropriate Requirements
AOC	Area of Contamination
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIWMB	California Integrated Waste Management Board
DLM	Designated Level Methodology
DTSC	Department of Toxic Substances Control
ESL	Environmental Screening Level
FMC	FMC Corporation
FS	Feasibility Study
HRA	Health-based risk assessment
MCLs	Maximum Contaminant Levels
PAHs	Polynuclear aromatic hydrocarbons
PELs	Permissible exposure limits
RAOs	Remedial Action Objectives
RAP	Remedial Action Plan
RAW	Remedial Action Workplan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RWQCB	State of California Regional Water Quality Control Board – Central Valley Region
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
SSTLs	Site-specific target levels
STLC	Soluble Threshold Limit Concentrations
SWRCB	State Water Resources Control Board
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TTLc	Total Threshold Limit Concentrations
TLVs	Threshold Limit Values
TPH	Total petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
VCA	Voluntary Cleanup Agreement

## 1.0 INTRODUCTION

Pursuant to the Voluntary Cleanup Agreement (VCA), Docket No. HSA-A 02/03-003, between FMC Corporation (FMC) and the State of California, Environmental Protection Agency, Department of Toxic Substances Control (DTSC), effective July 8, 2002, with respect to the FMC Site at 1200 Graphics Drive, Modesto, Stanislaus County, California (Site), FMC submitted a *Feasibility Study for Soil and Groundwater and Removal Action Workplan for Soil* (FS/RAW) (GeoTrans, 2005a) to DTSC and the State of California Regional Water Quality Control Board – Central Valley Region (RWQCB) on December 5, 2005. FMC received comments from DTSC and RWQCB dated February 1, 2006. These comments included the recommendation that “the entire site should be addressed as a RAW or RAP (depending on cost) with soil impacts to human health addressed as an interim removal action.” FMC met with representatives of DTSC and RWQCB on February 7, 2006 to review and discuss the agencies’ comments. It was agreed that the Removal Action Workplan, included in the December 5, 2005 submittal as Section 12, would be revised to address DTSC’s comments specific to that section and submitted as a stand alone document.

This report, *Revised Interim Action Removal Action Workplan* (Revised Interim RAW), has been prepared in accordance with that agreement. Specifically, this Revised Interim RAW addresses DTSC’s comments regarding confirmation sampling, the transportation plan, and the backfill and restoration plan, and presents the Revised Interim RAW as a stand alone document. This Revised Interim RAW describes the process to excavate soils identified to exceed the health-based Site-specific target levels (SSTLs) defined in the health-based risk assessment presented as the revised Appendix G in the *Addendum to the Comprehensive Remedial Investigation Report* (Addendum to the Comprehensive RI) (GeoTrans, 2005b), dated January 2005, which was approved by DTSC in their letter dated March 29, 2005. Brief summaries of the Site background, setting, conditions and the Site health-based risk assessment (HRA) have been extracted from the December 5, 2005 FS/RAW.

FMC met with representatives of DTSC and RWQCB on April 20, 2006 to discuss FMC's preliminary results modeling the infiltration at the Site. It was agreed that the Interim RAW, initially submitted to the agencies on March 31, 2006, would be revised to include the following portions from the FS/RAW applicable to soils above health-based SSTLs: applicable or relevant and appropriate requirements (ARARs); remedial action objectives (RAOs); and an evaluation of alternative remediation technologies.

It was also agreed in the February 7, 2006 and April 20, 2006 meetings to revise the December 5, 2005 submittal, removing Section 12, and separately submit a revised Feasibility Study which would address DTSC's and RWQCB's comments specific to those sections of the report. Lastly, it was agreed that several of the comments included in the agencies' February 1, 2006 letter would be best addressed in a future report, a Final Remedial Action Plan (RAP) with respect to the entire Site, rather than in the Revised Interim RAW or the revised Feasibility Study, and that, in accordance with the schedule included in the VCA, the RAP would be due six (6) months after approval of the revised Feasibility Study.

## **2.0 BACKGROUND**

The 43-acre Site is located in an industrial area of Modesto, California, adjacent to Highway 99, as shown on Figure 1. The Site is fenced and currently consists of vacant ground and several empty buildings. The Site was developed as a manufacturing facility to produce barium chemicals from barite ores in the late 1920s. FMC acquired the property and facilities in 1948. FMC began producing strontium chemicals from celestite ores in 1960. The facility also produced various other chemicals, including sodium sulfide from by-products of the barium and strontium manufacturing processes. Arsenic was brought to the Site as a raw material to produce arsenical compounds. Peak production occurred at the Site in the 1970s, when approximately 200 people were employed. Unlined on-site evaporation ponds were used to manage residues from the processing of barite and (after 1960) celestite ores from the 1950s through the late 1970s.

Production stopped in May 1984. By March 1985 the manufacturing facility was dismantled, inventory eliminated, equipment removed, and the production buildings demolished. While portions of the Site have been leased since 1985, the Site is currently unoccupied and idle except for an active water supply well (FMC Production Well No. 5) leased to the City of Modesto (City Well No. 56), and groundwater monitoring and extraction wells and a groundwater treatment system for remediation purposes.

Over 200 soil borings and 450 soil samples have been collected and analyzed across the Site from 1990 through 2004 to characterize Site soil constituents. Historically, barium had been identified to be the main constituent of interest in Site soils; however, every Title 22 metal has been detected in some samples of Site soils, as have general minerals. Additional constituents of interest in soils include polynuclear aromatic hydrocarbons (PAHs) and total petroleum hydrocarbons (TPH). The nature and extent of Site soil investigations were characterized in the Addendum to the Comprehensive RI, which was approved by DTSC in their letter dated March 29, 2005.

### **3.0 SITE SETTING**

The Site is underlain by a thick sequence of unconsolidated deposits composed of interlayered sand, silt, and clay. The deposits are anisotropic and heterogeneous. The upper 100 feet (Modesto Formation) is immediately underlain by the Riverbank Formation to the maximum depth of exploration at the Site. The blue clay aquitard of the Riverbank Formation occurs at a depth of approximately 165 feet below the Site.

Surficial deposits consist of predominantly sand in the northern and central area of the Site, and predominantly silts in the area to the southeast. A hard pan or indurated layer has been observed intermittently across the northern portion of the Site, approximately 17 to 25 feet below ground surface. Approximately equal proportions of clay/silt and sand underlie these surficial materials at depth, with sands possibly slightly dominant in the northern third of the section and finer-grained materials slightly dominant in the southern two thirds of the section.

Most of the former evaporation pond area is immediately underlain by sand and silty sand. Below these surficial deposits, at a depth of approximately 15 to 25 feet, is a clay and silt layer which seems to be relatively continuous in this area. This is underlain by predominantly sand between depths of approximately 27 and 37 feet, with discontinuous, predominantly fine-grained materials below that to a depth of approximately 60 feet, the maximum depth of exploration in this area.

#### **4.0 SUMMARY OF HEALTH-BASED RISK ASSESSMENT AND SITE-SPECIFIC TARGET LEVELS FOR SOILS**

This section summarizes the health-based risk assessment (HRA) presented as the revised Appendix G in the Addendum to Comprehensive RI, dated January 2005, which was approved by DTSC in their letter dated March 29, 2005.

The HRA assessed whether current Site conditions pose a potential health hazard to future Site users, and calculated SSTLs for constituents of interest in soil and in shallow and deep zone groundwater. Based on the planned use of the Site for industrial and commercial purposes, the HRA evaluated potential exposure to chemicals detected in Site soils, using scenarios for future indoor commercial workers, future outdoor service workers, and future construction workers. Additionally, a screening residential scenario was conducted, including the assumption of contact with soil and ingestion of groundwater, even though current Site use and Site plans do not include zoning for residential purposes and redevelopment. Use of groundwater beneath the Site is considered hypothetical, and is expected to be restricted through a Land Use Covenant. Drinking water is supplied by the City of Modesto.

Results of the ecological screening assessments indicate that the Site and surrounding areas do not contain suitable habitat to sustain wildlife and there are no potentially complete ecological exposure pathways that require further consideration.

SSTLs for soil were developed for arsenic and PAHs (as benzo(a)pyrene equivalents) as the chemicals that contribute the most to the overall cancer risk (using  $1 \times 10^{-5}$ ) and for barium because it contributed most significantly to the overall hazard index for all pathways evaluated (using 1.0), although the hazard index value was still below the target level of 1.0. The calculated soil SSTLs are summarized below.

Constituent of Concern	Soil Health-Based SSTL (mg/Kg)	Rationale
Benzo(a)pyrene equivalents	1.2	Outdoor Service Worker
Arsenic	27	Indoor Commercial Worker
Barium	58,400	Construction Worker

TPH impacts have been identified in soil in a limited portion of the Site. TPH impacts protective of human health are defined by the Environmental Screening Level (ESL), as established in *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (RWQCB, 2005). For surface and shallow soils (less than 10 feet below ground surface) the ESL for residual TPH impacts is 1,000 mg/Kg under the Commercial/Industrial land use scenario.

The approximate areas of the Site with soil concentrations that exceed the health-based SSTLs for arsenic, PAHs, barium and TPH are graphically presented on Figure 2.

## **5.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS**

Selected remedial actions must be protective of human health and the environment. The remedial actions must attain "legally applicable or relevant and appropriate requirements" (ARARs). ARARs are defined in Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as standards, requirements, criteria, or limitations of federal environmental laws and any more stringent standards, facility siting laws.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminate, remedial action, location, or other circumstance at a Site. Relevant and appropriate requirements are those same standards mentioned above that, while not applicable at the Site, address problems or situations sufficiently similar to those encountered at the Site that their use is well suited to the particular Site. USEPA has divided ARARs into three categories to facilitate their identification: chemical-specific, location-specific, and action-specific.

ARARs are supplemented by to-be-considered (TBC) criteria that typically include policies and guidelines that have not been promulgated. Groundwater and soil ARARs are reviewed and summarized in this section, although this document presents a work plan for removal activities with respect to soils above health-based SSTLs only. The ARARs and TBCs for Site soil remediation are summarized in Table 1. The chemical-, location-, and action-specific ARARs identified to be critical to the development of the remedial alternatives for this Site are discussed below.

### **5.1 Chemical-Specific ARARs**

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in or discharged to the environment, e.g., maximum contaminant levels (MCLs) or other water quality criteria that establish safe levels in drinking water.

Chemical-specific ARARs for groundwater are included in this subsection as they relate to migration of Site constituents in vadose zone soils to shallow groundwater.

The Porter-Cologne Water Quality Control Act provides the framework for the Regional Water Quality Control Boards to establish "Basin Plans" for each of the nine regions. SWRCB Resolution No. 68-16 ("non-degradation Policy") requires that high quality surface and ground waters be maintained to the maximum extent possible. A *Compilation of Water Quality Goals* (Marshack, 2003) is part of the process used by the Central Valley RWQCB in selecting appropriate numerical values to implement the Basin Plan for setting cleanup levels and discharge limits.

SWRCB Resolution 92-49 ("Containment Zone policy") sets forth the RWQCB policy to require cleanup of all waste discharged and restoration of affected water to background conditions. Designated waste that is not excavated and moved from the Site must be addressed under SWRCB Resolution 92-49. Designated waste, defined in the Porter-Cologne Water Quality Control Act §13173, means either: 1) hazardous waste that has been granted a variance, or 2) nonhazardous waste that impacts groundwater causing concentrations that exceed applicable water quality objectives or that "could reasonably be expected to affect beneficial uses" of the groundwater. Site soils that exceed levels protective of groundwater (that exceed the Designated Level Methodology (DLM)(RWQCB, 1989) values) and that remain on Site are considered to be designated waste. Therefore, these soils are excluded from the removal action and must be handled in a manner consistent with Resolution 92-49.

During the June 14, 2005 meeting between DTSC, RWQCB and FMC, there was discussion regarding the Site compliance with SWRCB Resolution 92-49, with two administrative alternatives identified: (1) the Containment Zone policy included in that resolution; and (2) a Clean Up and Abatement Order, such as is currently in place. RWQCB advised that, based on initial review, there would likely not be any significant benefit in a Containment Zone designation versus the long-term monitoring plan that would be incorporated into an updated Cleanup and Abatement Order for the Site.

The remedial action objectives developed for Site groundwater must comply with chemical-specific guidelines. These guidelines include the California Safe Drinking Water and Toxic Enforcement Act of 1986 (California Code of Regulations (CCR), Title 22, Division 2, Chapter 3), the Porter-Cologne Water Quality Act (California Water Code, Division 7, Sections 13000 to 14958), SWRCB Resolution 68-16 (the non-degradation policy), SWRCB Resolution 88-63 (the Source of Drinking Water Policy), and SWRCB Resolution No. 92-49 (background evaluation). SWRCB Resolution 92-49 provides for cleanup of impacted groundwater to attain background water quality or the best water quality that is reasonable achieved.

### **5.2 Location-Specific ARARs**

Location-specific ARARs restrict actions or chemical concentrations in certain environmentally sensitive areas. Examples of areas regulated under various federal and state laws include flood plains, wetlands, and locations where endangered species or historically significant cultural resources are present.

No location-specific ARARs have been identified for the Site. The Site is not located in or near a floodplain or known Holocene faults. The Site is relatively flat, with no off-site drainage of surface water to the waters of the State. The Site does not contain suitable habitat to sustain wildlife nor would significant number of wildlife be expected to remain on the Site due to the lack of suitable habitat. No endangered or threatened plant or animal species, have been identified at the Site (Exponent, 2005).

### **5.3 Action-Specific ARARs**

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions or conditions involving specific substances. CCR Title 22, Division 4.5, Chapter 11 is used to evaluate the hazardous nature of soil for disposal purposes. Soil excavated and removed from the Site would have to be classified as hazardous or non-hazardous under CCR, Title 22. Total threshold limit concentrations (TTLCs) and soluble threshold limit concentrations (STLCs) can be used to identify whether soil is hazardous or non-hazardous for disposal purposes. Toxicity characteristic leaching procedure (TCLP) concentrations are used to identify whether soil is a Resource

Conservation and Recovery Act (RCRA) hazardous waste. (There are no "listed hazardous wastes" issues with respect to the soils at the Site.) CCR Title 23 applies to actions that dispose of hazardous waste (as defined by CCR Title 22). Title 23 requires that hazardous waste be discharged to Class I waste management units.

Actions that dispose of designated waste are governed by CCR, Title 27, Combined SWRCB/CIWMB Regulations, Division 2. Title 27, §20200(c) and §20210, require that designated waste be discharged to Class I or Class II waste management units. As documented in FMC's July 19, 2005 letter to the RWQCB, and confirmed by RWQCB's July 28, 2005 response letter, during the June 14, 2005 meeting between DTSC, RWQCB and FMC, FMC requested clarification from RWQCB regarding the applicability of CCR Title 27 for soils left on the Site. RWQCB clarified that CCR Title 27 would apply in the event that soils exceeding levels protective of groundwater (exceeding DLM values) were excavated and moved to a location on Site where the soils did not exceed levels protective of groundwater (did not exceed DLM values). Also, RWQCB clarified that movement of soils that exceed levels protective of groundwater to another area of the Site that contains soils that also exceed the levels protective of groundwater would not be subject to CCR Title 27 requirements. Rather, the movement of soils with constituents that exceed concentrations protective of groundwater within the same footprint are not considered to increase the threat to groundwater and fall under the purview of SWRCB Resolution 92-49.

In addition, all parties at the June 14, 2005 meeting noted that a brownfields redevelopment is proposed for this Site and much of the Site will be covered with roads, parking lots, and buildings. The RWQCB stated that while Resolution 92-49 requires source removal, the RWQCB will accept a Site cover through development features, such as buildings, parking lots and roads, which will achieve source minimization combined with the downgradient groundwater extraction and treatment system. The Site redevelopment will minimize infiltration through impacted soils, thus minimizing potential leaching of constituents from soil to groundwater. RWQCB stated that as long as the cover of roads, parking lots, and buildings met the applicable local building and zoning codes, no other standards would be required for or applied to the covers.

DTSC and RWQCB generally recognize the USEPA's concept of Area of Contamination (AOC), in relation to triggering applicable sections of CCR, Title 22, Title 23 and Title 27. Under CERCLA, the USEPA describes an AOC as an existing area of continuous contamination of varying amounts and types. The AOC concept and the term placement were first explained in the proposed CERCLA National Contingency Plan (NCP) [see 53 FR 51444 (December 21, 1988) and 54 FR 41566 (October 10, 1989), respectively], they are based on interpretations under RCRA and, therefore, apply equally to CERCLA response actions and RCRA corrective action sites, cleanups under state law, and voluntary cleanups (USEPA letter from M. Shapiro, S. Luftig, and J. Clifford to RCRA Branch Chiefs/CERCLA Regional Managers dated March 13, 1996). AOCs are identified on a case-by-case basis and are delineated by the extent of continuous contamination.

Under CERCLA, "placement" into an AOC does not occur if wastes are:

- moved within an AOC;
- left or treated in place (e.g., capping, in situ treatment such as permeable treatment beds or vitrification); or
- consolidated within the AOC from which they were extracted.

Under DTSC and RWQCB usage of the AOC concept, the word "discharge" used in Titles 23 and 27 is analogous/similar to "placement" as described above and used in CERCLA and RCRA. The distribution of soil with concentrations that exceed the DLM values is nearly continuous across the Site and therefore meets the definition of an AOC. As discussed at the June 14, 2005 meeting with DTSC, RWQCB, and FMC, the entire Site will be considered an AOC. The AOC designation will allow movement of impacted soil within the footprint of the AOC during remedial and Site development activities.

The objectives of the California Environmental Quality Act (CEQA) are to identify projects that may have "significant environmental effects" and avoid the significant environmental effects or mitigate the effects where feasible. Under CEQA, DTSC will conduct an Initial Study for the Site and determine which one of the following

environmental review documents is required:

1. Negative Declaration, if DTSC finds no "significant" impacts;
2. Mitigated Negative Declaration, if DTSC finds "significant" impacts but revises the project to avoid or mitigate those significant impacts; or
3. Environmental Impact Report (EIR), if DTSC finds "significant" impacts.

San Joaquin Valley Unified Air Pollution Control District has authority to implement the federal and state air quality management programs through the State Implementation Plan. This would be an applicable requirement for any remedial action at the Site that creates an air discharge, including excavation activities that generate dust.

City of Modesto Municipal Code Section 5-10.301 requires a grading and erosion control permit to grade, fill, excavation, store or dispose of 350 cubic yards or more of soil or earth material or clear and grub more than one-half acre of land within the City limits. Any Site remedial alternative that involves excavating or grading more than these limits will require a permit.

## **6.0 REMEDIAL ACTION OBJECTIVES**

This section presents the remedial action objectives (RAOs) for soils above health-based SSTLs. RAOs provide the medium-specific or area-specific requirements needed to protect human health and the environment. The remediation technologies and approaches considered in this Revised Interim RAW will be evaluated with respect to the RAOs.

The preliminary RAO for soils above the health-based SSTLs presented in the 2005 RI Addendum is:

- Mitigate potential unacceptable risk due to direct contact exposure to Site soil;

The final RAOs build upon the preliminary RAOs by defining constituent specific numerical goals for each media. The numerical goals are based on the exposure pathways and acceptable risk levels defined in the HRA in Section 4 and the chemical-specific ARARs defined in Section 5. The following sections present soil RAOs to carry forward in the development of remediation alternatives.

### **6.1 Soil Remedial Action Objectives**

Soil RAOs are developed using health-based SSTLs for protection of human health. As discussed in Section 4, the HRA calculated health-based SSTLs determined to be protective of potential health risks based on the planned use of the Site as a business park. SSTLs for soils were determined for arsenic and PAHs for a future commercial worker and a future construction worker respectively, because these scenarios have calculated risk estimates greater than  $1 \times 10^{-5}$ . Additionally, an SSTL for barium was calculated because barium appears to contribute significantly to the overall non-cancer hazard index value for the pathways evaluated, although still below the health hazard target level of 1.0.

The health-based SSTLs for soil are:

- 27 mg/Kg for arsenic;
- 1.2 mg/Kg for PAHs as benzo(a)pyrene equivalents; and
- 58,400 mg/Kg for barium.

TPH impacts protective of human health are defined by the ESLs as established in *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater* (RWQCB, 2005). For surface and shallow soils (less than 10 feet below ground surface) the ESL for residual TPH impacts is 1,000 mg/Kg. The use of the ESL value of 1,000 mg/Kg for TPH was confirmed through approval of the 2005 RI Addendum, including the HRA in Appendix G.

The areas of Site soil impacts with constituent concentrations above the health-based SSTLs and the ESL are graphically presented on Figure 2. The “footprint” of the soil with concentrations greater than the health-based SSTLs is approximately 63,000 square-feet (1.4 acres), and extends generally to a depth of one foot, although some arsenic impacts extend to ten feet below ground surface.

## **6.2 Summary of Remedial Action Objectives**

The preliminary RAO was defined for soils above health-based SSTLs in the 2005 RI Addendum. Soil RAOs are based on:

- SSTLs for health-based standards, as defined in Section 4.

Numerical goals have been established and applied to the preliminary RAO in order to develop the final RAOs. The following list expands the preliminary RAO with media- and constituent-specific goals to define the final RAOs for the Site:

- Mitigate potential unacceptable risk due to direct contact exposure to Site soils with constituent concentrations that exceed the health-based SSTLs:
  - Barium concentrations greater than 58,400 mg/Kg;
  - Arsenic concentrations greater than 27 mg/Kg;
  - PAH concentrations greater than 1.2 mg/Kg as BaP equivalents; and
  - TPH concentrations greater than 1,000 mg/Kg.

## **7.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES**

This section identifies viable technologies to remediate the impacted soils above health-based SSTLs to achieve the RAOs presented in Section 6. The technologies are screened for selection based upon:

- Ability to meet the RAOs;
- Effectiveness;
- Implementability; and
- Approximate Cost.

The RAOs address: mitigating unacceptable risks due to direct contact exposure to Site soils that are above health-based SSTLs. Site soils are evaluated based on SSTLs for protecting human health.

Effectiveness is evaluated based on a technology's adequacy and reliability to achieve the RAOs. Implementability considers the obstacles that a technology may encounter at the Site. This includes practical/physical limitations, permitting limitations, and coordination with anticipated Site development plans. Cost levels will be evaluated for screening purposes based on approximate costs per ton of soil material.

A variety of remediation technologies may be applicable to soil impacts at the Site. Appropriate technologies are identified and grouped into the following four categories for screening purposes:

- Institutional Actions;
- Containment Actions;
- Treatment Actions; and
- Removal Actions.

Institutional actions are intended to limit access to the impacted materials. Typically this occurs through site access and land use restrictions. Containment measures are intended to minimize, prevent, or reduce migration of constituents from soil to exposure pathways and potential receptors. Treatment technologies are intended to remove the constituents from the media or alter the constituents into non-hazardous constituents. Removal technologies include physically removing the impacted materials from the Site.

## **7.1 Soil Remediation Technologies**

This subsection reviews the ability of technologies to achieve the RAOs for impacted soils. The evaluations are summarized in Table 2 and a detailed discussion is presented below. Soil remediation technologies identified for screening include:

<u>Response Action</u>	<u>Remediation Technology</u>
No Action	<ul style="list-style-type: none"><li>◦ None</li></ul>
Institutional Actions	<ul style="list-style-type: none"><li>◦ Deed Restrictions/Land Use Covenants</li></ul>
Containment Actions	<ul style="list-style-type: none"><li>◦ Caps and Covers</li><li>◦ Subsurface Barriers</li><li>◦ Dust control</li></ul>
Treatment Actions	<ul style="list-style-type: none"><li>◦ Stabilization</li><li>◦ Soil Flushing</li><li>◦ Soil Washing</li><li>◦ Chemical Oxidation</li><li>◦ Bioremediation</li><li>◦ Soil Heating</li></ul>
Removal Actions	<ul style="list-style-type: none"><li>◦ On-Site Landfill</li><li>◦ Off-Site Disposal</li></ul>

The areas and volumes of soil to which remedial action may apply are considered in this screening evaluation. Figure 2 illustrates the approximate areas of soils with constituent concentrations that exceed health-based SSTLs. These impacts are less than two foot below ground surface, except for one area of arsenic impacts that extends 10 feet below ground surface. Approximately 3,100 cubic yards (5,500 tons) of in-place soil require remediation from these areas, as defined in Table 3.

### **7.1.1 No Action**

The No Action response action is used as a baseline for comparison to other preliminary response actions. Under this alternative, the existing shallow zone groundwater extraction, treatment, and monitoring systems would be shut down and portions of the property would not be developed due to unacceptable health risks. This technology will be carried forward in the evaluations, in accordance with the RI/FS

Guidance.

### 7.1.2 Institutional Actions

Institutional actions include deed restrictions that could limit site access and land uses to protect human health. These types of controls could also impose specific improvements prior to future land uses. Institution controls could also limit groundwater use on Site, such as restricting the use or construction of on-site domestic wells in an area of impacted groundwater.

Deed restrictions control contact with impacted materials by limiting certain land uses. Residential development, day care centers, hospitals, and schools are examples of land uses that could be prohibited based on the constituents that remain on the property. Limitations on areas of construction, construction worker training, and personnel protection measures are examples of requirements that could be defined by deed restrictions. This technology is relatively easy to implement and has a low cost. By itself, the effectiveness is limited because the impacted soils remain in place.

Site access restrictions include security fencing and potentially security guards to prevent Site access by non-qualified personnel. This technology is relatively easy to implement and has a low cost. Its effectiveness, however, is limited because the impacted soils remain in place and trespassing is often difficult to control.

Fencing is currently in place at the Site, although restricting site access is not consistent with the long-term development plans for the Site. Restricting land uses will likely be incorporated into the final Site remediation to account for residual risks that could be present prior to, during, and following Site development.

### 7.1.3 Containment

Containment technologies isolate the impacted materials from further migration and minimize their exposure pathways. Site soils could be isolated from above by installing a cap or a Site cover; on the sides by installing a subsurface vertical barrier such as a slurry wall, grout curtain, or sheet pile wall; or on the bottom by creating a horizontal impermeable zone beneath the impacted materials. These containment technologies

would prevent human contact with the surface soils. Dust controls are also a containment technology.

### Subsurface Barriers

Subsurface vertical barriers can be installed around or downgradient of an impacted source area to prevent constituent migration. Vertical barriers are typically used when the impacted materials are relatively shallow (30 to 40 feet below ground surface) and the barriers are usually keyed into an underlying aquitard, such as the Blue Clay layer. Hanging barriers are not keyed into an underlying aquitard and can be used when shallow horizontal migration presents a significant risk; such as migration into a nearby surface water.

Horizontal barriers can be installed beneath a relatively small area, such as beneath a tank or tank farm area. Deeper subsurface horizontal barriers can be installed using pressure grouting techniques, although the integrity of the impermeable layer is difficult to achieve under field conditions.

Neither the subsurface vertical nor horizontal barriers prevent human contact with the surface soils. In the isolated areas where constituent concentrations are above the health-based SSTLs, the impacts are within a few feet of the surface and subsurface barriers are not needed. Therefore, vertical and horizontal barriers will be eliminated from further consideration.

### Caps and Covers

Caps and covers are proven technologies that could be effective at preventing human contact with impacted surface soils with constituent concentrations greater than the SSTLs

The term cap is often associated with an impermeable engineered structure that satisfies specific construction and performance requirements, such as landfill closure requirements defined in Title 27, CCR, §21090. A cap structure is typically maintained to preserve its integrity and other development features would not be allowed in a capped area.

A cap over the soils with constituent concentrations greater than the SSTLs would create isolated areas that would be inaccessible to development. A cap over the approximate 1.4 acres of soils above the health-based SSTLs would cost over \$200,000, based on \$150,000 per acre, and would not be compatible with the future development plans for the Site. Therefore, a cap over the soils with constituent concentrations greater than the health-based SSTLs is not considered a viable technology for the Site and will not be carried forward in the evaluations.

#### Dust Control

Dust controls prevent air borne emissions from the Site. Dry surface soils are susceptible to being carried off Site by high winds. This can be particularly troublesome during construction activities when surface soils are unearthed or disturbed. It is common to spray clean water over dry excavated or stockpiled soils to prevent dust emissions. Sometimes tarps or other temporary coverings will be used on stockpiled or truck loaded soils to prevent dust emissions. Dust controls are not considered a viable long-term solution because they do not prevent dermal contact with in-place surface soils. Therefore, this technology is eliminated from further consideration, although it will likely be an element of health and safety measures during implementation of other technologies.

#### 7.1.4 Treatment

The impacted soils above health-based SSTLs could be remediated either in-situ (in place) or ex-situ. This subsection reviews technologies that could be applied either in-situ or ex-situ to the impacted soils at the Site.

#### Stabilization

Stabilization involves applying a binding agent, such as cement, lime, fly ash, or polymers to bind with the soil particles and reduce the mobility of the constituents. This technology could be applied to the impacted soils with concentrations above health-based SSTLs. Soil stabilization is feasible for the arsenic and barium impacted soils, while the performance would be uncertain with the PAH and TPH impacted soils. A treatability study would be necessary to evaluate a variety of binding agents with the

soils and mixture of constituents present at the Site. The cost of a treatability study would be on the order of \$100,000, and the cost of implementing this technology (after the treatability study) is considered high (\$200 to \$400 per ton). The technology costs for stabilization of soils with constituent concentrations greater than the SSTLs would be approximately \$1 million to \$2 million, if positive results are obtained from the treatability study. Implementation of stabilization would require at least two years to conduct treatability tests, design a system, and implement a full-scale remediation.

#### Soil Flushing

Soil flushing removes soluble constituents from the soil matrix by applying clean water to in-place soils and collecting the rinseate. This technology is not considered to be appropriate or applicable for the soil impacts greater than health-based SSTLs that are less than two feet below ground surface.

#### Soil Washing

Soil washing is an ex-situ process where excavated soils are mixed with water and surfactants to remove the constituents. Soil washing could be applied to the soils with constituent concentrations above the health-based SSTLs. It is uncertain whether soil washing would be effective with the mixture of constituents and treatability testing would be necessary. Soil washing is an expensive technology, typically costing \$500 or more per ton, and often creating wastewater and sludge byproducts that require further treatment and disposal. As such, soil washing is not recommended for further consideration.

#### Chemical Treatment

Chemical treatment involves applying reactive chemicals, such as hydrogen peroxide or ozone, to breakdown organic constituents into non-toxic chemicals. Complete breakdown usually results in carbon dioxide and water, while incomplete breakdown can create other toxic or non-toxic by-products. Chemical treatment can be applied in-situ or ex-situ depending on the site specific conditions. The key to a successful chemical treatment system is achieving good contact between the applied chemical and the constituents.

This technology is theoretically applicable to the PAHs and TPH impacted soils, but would not have any effect on the arsenic and barium impacted soils. The PAH and TPH soils could be excavated, treated ex-situ, and placed back on the Site. The treatment effectiveness, however, is uncertain and treatability testing would be required. Implementation would require at least two years to conduct treatability tests, design the systems, and conduct a full-scale remediation. The cost of this technology is anticipated to be approximately \$300 to \$500 per ton.

The effectiveness of chemical treatment is uncertain, implementation will be time consuming, and the costs are higher than other technologies. Therefore, chemical treatment is not recommended for further consideration.

#### Biological Treatment

Biological treatment involves creating suitable environmental conditions for microorganisms to breakdown organic constituents into non-toxic chemicals. Biological treatment can be applied in-situ or ex-situ, and under aerobic or anaerobic conditions, depending on the site conditions. The breakdown products depend on the biological systems at the Site and can create toxic or non-toxic by-products. The key to a successful biological treatment system is achieving the right environment for the microorganisms that are suitable for the constituents present at the Site.

While biological remediation has been successfully used to address TPH compounds in soils, its application to PAHs is problematic. It is unlikely that arsenic and barium impacted soils would be affected by biological treatment. The PAH and TPH soils could be excavated, treated ex-situ, and placed back on the Site. The treatment effectiveness, however, is uncertain and treatability testing would be required. Implementation would require at least two years to conduct treatability tests, design the systems, and conduct a full-scale remediation. The cost of this technology is anticipated to be approximately \$200 to \$300 per ton for PAH impacted soils and \$50 to \$100 per ton for TPH impacted soils.

The effectiveness of biological treatment is uncertain for the PAH impacted soils,

implementation will be time consuming, and the costs are higher than other technologies. Biological treatment could be readily applied to the TPH impacted soils, although the volume of isolated TPH impacts is low and the start-up costs of an independent treatment technology would be impractical. Therefore, biological treatment is not recommended for further consideration.

### Thermal Treatment

Thermal treatment involves exposing the Site constituents to elevated temperatures (1000°F to 2000°F) to breakdown organic constituents into non-toxic chemicals. Thermal treatment is theoretically applicable to PAHs and TPH, but would not be effective in remediating the metals. Thermal treatment can be applied in-situ or ex-situ depending on the site conditions and project needs. The chemical breakdown is usually complete with incineration, while lower temperature thermal treatment technologies (such as steam applications or catalytic oxidizers) apply enough heat to alter the state of the constituents. Waste streams (such as off-gases) can be created in thermal treatment technologies and the final by-products are carbon dioxide, water, and non-toxic compounds when complete destruction is achieved. Toxic by-products can be produced when the thermal destruction is incomplete.

The key to a successful thermal treatment system is applying sufficient heat to the organic constituents and controlling the waste streams. For evaluation purposes, it is anticipated that Site soils with PAH and TPH concentrations greater than the SSTLs would be treated with an ex-situ thermal oxidation process at the Site. The PAH and TPH soils that exceed SSTLs could be excavated, treated ex-situ, and placed back on the Site.

The treatment effectiveness is uncertain with respect to potential dioxin formation from thermal oxidation of the PAH compounds. Therefore, treatability testing would be required and implementation would require at least two years to conduct treatability tests, design the systems, and conduct a full-scale remediation. The cost of this technology is considered high and is anticipated to be approximately \$300 to \$500 per ton for PAH and TPH impacted soils.

The effectiveness of thermal treatment is uncertain for the PAH impacted soils, implementation will be time consuming, and the costs are higher than other technologies. Therefore, thermal treatment is not recommended for further consideration.

#### 7.1.5 Removal

Removal technologies involve physically removing the impacted soils from their current location and placing them in a secure setting. An on-site landfill and off-site disposal are practical options for the soils with impacts above health-based SSTLs.

##### On-Site Landfill

An on-site landfill requires constructing a soil containment facility that meets the minimum requirements of CCR, Title 23, Division 3, Chapter 15. These regulations define landfill design and construction standards that must be achieved to prevent any leakage or discharge from the completed facility. As shown in Table 3, the total volume of soils with concentrations above health-based SSTLs is approximately 3,100 cubic yards in place, or 4,000 cubic yards of excavated materials, which would weigh approximately 5,500 tons. 4,000 cubic yards of material would require a disposal cell that is approximately 100 feet square (0.2 acre) and 11 feet deep. These dimensions are relatively small for a landfill and typically off-site disposal has cost advantages at small quantities. Construction of an on-site landfill also creates a long-term liability for the site, requires long-term operation and maintenance activities, and implementation is not compatible with the future development plans for the Site. In addition, permitting and public acceptance of a landfill facility could be difficult in a developed area.

The approximate cost to construct an on-site 100-foot square and 11 feet deep landfill is \$500,000. The costs to design, permit, and conduct community involvement review meetings is likely to range between \$100,000 to \$200,000. In addition, an on-site landfill would require long-term operation and maintenance costs of approximately \$20,000 to \$50,000 per year. For these reasons, an on-site landfill is not recommended for further consideration.

### Off-Site Disposal

Off-site disposal requires excavating the impacted soils and transporting these soils to a licensed landfill for disposal in accordance with local, state and federal regulations. A soil transport truck can carry approximately 23 tons per load. Therefore, approximately 240 truck loads would be required to transport the 5,500 tons of soil to an off-site disposal location. Assuming that 10 trucks could be loaded each day, the work could be completed in approximately 24 work days. The costs are anticipated to be moderate at \$100 to \$150 per ton. This technology could be implemented within one year, and could be coordinated with the anticipated future development of the entire Site. Therefore, this technology will be carried forward for further consideration.

### ***7.2 Selection of Representative Technologies for Remediation of Soils Above Health-Based SSTLs***

This subsection summarizes the technologies that will be carried forward based on the evaluations presented in Section 7.1. The proposed interim remedy for soils with constituent concentrations greater than the health-based SSTLs is addressed in Section 7.3.

Off-site disposal is the preferred technology to carry forward for soil impacted with concentrations above the health-based SSTLs. Other technologies were evaluated, but none were viable for the mixture of metals, PAHs, and hydrocarbons present in the soils. Implementation of off-site disposal of soils impacted with concentrations above health-based SSTLs is also conducive with property development plans. This technology could also be implemented in the near-term and thereby reduce health-based risks to acceptable levels prior to property development activities.

### ***7.3 Proposed Interim Remedy for Soils Above Health-Based SSTLs***

Excavation with off-site disposal is the preferred technology for soils with constituent concentrations greater than the health-based SSTLs. As presented in Section 7.2, other technologies were evaluated, but were determined to be non-viable. It is proposed to implement this alternative as an interim remedy because these soils present a health risk to future construction activities, there are no competing

technologies to evaluate or test, and soil removal activities can be implemented independent of other remediation activities.

This section presents excavation with off-site disposal with respect to the nine evaluation criteria used in feasibility studies (USEPA, 1988). The removal action work plan is presented in Section 8.

#### 7.3.1 Overall Protection of Human Health and the Environment

Soil removal will protect human health and the environment by removing soils that are a health risk and placing these soils in licensed landfills in accordance with local, state, and federal regulations.

#### 7.3.2 Compliance with State and Federal ARARs

Removing impacted soils from the Site will provide progress toward overall compliance with the ARARs discussed in Section 5. Compliance with chemical-specific ARARs will be improved by removing soils that exceed the health-based SSTLs. Action-specific ARARs that may be invoked by the removal activities are the City of Modesto grading and erosion control permits. These permits will be obtained prior to beginning the field activities.

#### 7.3.3 Long-term Effectiveness and Performance

Soil removal will provide long-term effectiveness by removing the soils and elevated constituent concentrations from the Site. Permanent containment of the materials will be maintained by the licensed landfills in accordance with local, state, and federal regulations.

#### 7.3.4 Reduction of Toxicity, Mobility, or Volume

Soils removed from the Site will be placed in licensed landfills, thereby reducing their mobility. In terms of the Site conditions, the toxicity and volume of impacted materials will also be reduced.

#### 7.3.5 Short-term Effectiveness

Implementation of the soil removal activities will create short-term risks that can be

mitigated through engineering controls. It is expected that dust control and erosion control measures will be used to prevent off-site migration of constituents during excavation, stockpiling, loading, and hauling activities. Worker protection requirements will be defined for specific tasks in health and safety plans to be prepared by qualified remediation contractors.

#### 7.3.6 Implementability

Soil removal activities are readily implemented because the necessary equipment, materials, and labor are commonly available. Local permits can be obtained with appropriate design plans.

#### 7.3.7 Cost

The estimated cost is \$780,000 for the soil removal activities, as presented in Table 4. These costs are estimated based on the soil quantities shown on Drawing C-1 and quotes from local soil haulers and landfills. Drawing C-1 defines the minimum excavation limits to be surveyed in the field, and these are slightly larger than the areal extents identified on Figure 2. It is anticipated that the soils impacted with barium and PAHs will be classified as California-hazardous and the soils impacted with TPH and arsenic will be classified as non-hazardous.

#### 7.3.8 State Acceptance

Soil removal should achieve the RAOs for soils with constituent concentrations greater than SSTLs. Therefore, it is expected that soil removal will receive state acceptance as an interim remedy.

#### 7.3.9 Community Acceptance

Removing the soils with constituent concentrations greater than the health-based SSTLs will allow development of the property for industrial and commercial purposes consistent with the Kansas-Woodland Avenue Business Park Plan. As such, it is expected that soil removal will receive community acceptance as an interim remedy.

#### **7.4 Summary**

The HRA identified health-based SSTLs for soil. Excavation of soils that exceed these levels combined with off-site disposal at a licensed facility will achieve the RAO of mitigating potential unacceptable risk due to direct contact exposure to Site soils with constituent concentrations that exceed the health-based SSTLs. This remedy can be implemented as a removal action on an interim basis and thereby provide an achievable solution in the near-term that will allow for future beneficial uses of the Site. The following section presents the detailed work plan to implement the soil removal activities.

## **8.0 REMOVAL ACTION WORKPLAN**

This section presents the design and implementation activities to remove soils with constituent concentrations that exceed the health-based SSTLs from the Site, or exceed the ESL for TPH for the Commercial/Industrial land use scenario. The removal action consists of excavating these impacted soils and disposing of them at a Class I permitted landfill, e.g., Kettleman Hills Landfill, when constituent concentrations are classified as RCRA-hazardous or California-hazardous, or at a Class II permitted landfill, e.g., Altamont Landfill, when constituent concentrations are classified as non-hazardous. This section presents the removal action design; implementation requirements; and project management components.

### **8.1 Removal Action Design**

Soils with the following constituent concentrations will be excavated and removed from the Site:

- Barium            $\geq 58,400$  mg/kg
- PAHs            $\geq 1.2$  mg/kg as BaP equivalents
- Arsenic        $\geq 27$  mg/kg
- TPH            $\geq 1,000$  mg/kg

The excavation areas and approximate volumes are shown on design Drawing C-1. The excavated materials will be stockpiled and composite samples will be collected from each stockpile. Split samples will be sent to the landfill laboratory and an independent laboratory for analysis of the expected constituents. The soils will be disposed of at the appropriately permitted landfill, based on the analytical testing results, and in accordance with local, state, and federal regulations.

### **8.2 Implementation Requirements**

The implementation plan consists of the following: site preparation; field documentation; excavation plan; air and meteorological monitoring; dust control plan; confirmation sampling; transportation plan for off-site disposal; and the backfill and restoration plan.

### 8.2.1 Site Preparation

The Site is a former industrial manufacturing facility that was shutdown in 1984 and demolished in 1985. The primarily vacant property consists of native grasses, empty buildings, and remnants of paving and foundations. In addition, one functional office building, a parking lot, an active water supply well leased to the City of Modesto (City Well No. 56), FMC Well No. 6, which is currently inactive, three groundwater extraction wells, the groundwater treatment plant, and associated monitoring wells are located on the property. The property is surrounded by a security fence.

Designated excavation areas are shown on Drawing C-1 with survey coordinates defining the initial excavation limits. A licensed land surveyor shall define the excavation limits in the field with appropriate off-set staking to allow reconstruction of the excavation limits by field inspectors. Utility clearances shall be obtained through USA Alerts and confirmed by an independent contractor.

It is anticipated that the existing security fencing will be sufficient for purposes of security during the excavation and grading work, although an overnight guard may be employed to prevent vandalism. The excavation contractor will be responsible for any security measures that are determined to be needed in addition to the fencing.

Erosion shall be controlled by maintaining downward grades in the work areas toward the center of excavated areas. Based on the Site soils types, it is expected that precipitation will infiltrate and not leave the property. Therefore, specific erosion control facilities are not needed.

The City of Modesto requires a Grading and Erosion Control permit prior to beginning excavation activities at sites that exceed 0.5 acres in size or generate more than 350 cubic yards of soil or earth material. The contractor shall be responsible for obtaining all local and state permits that may be required for the excavation, transportation, and disposal of the impacted materials. Because the footprint of the excavation is less than 5 acres, an air discharge permit will not be required from the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD). However, the excavation activities must

comply with the SJVUAPCD Rule 8021 Sections 5.1 through 5.4, which applies to all construction, demolition, excavation, extraction, and other earthmoving activities. A copy of this rule is presented in Appendix B. The contractor shall be responsible to provide written notification of the excavation activities to the SJVUAPCD at least 48 hours before beginning the excavation.

The contractor shall also be responsible for preparing a project-specific Health and Safety Plan for activities associated with the soil excavation, sampling, and disposal. A general Site-wide Health and Safety Plan is presented in Appendix A that describes the Site and identifies the Site constituents. The general Health and Safety Plan also identifies the applicable permissible exposure limits (PELs) and Threshold Limit Values (TLVs) for total air borne concentrations for the constituents which will be encountered during the soil excavation activities. Section 8.2.4 provides a discussion of air monitoring during soil excavation activities.

#### 8.2.2 Field Documentation

Field activities will be documented. A pre-construction meeting will be held approximately one week prior to beginning field activities. Daily tailgate safety meetings will be held and field activities will be documented in field logbooks by FMC's field representatives. Site activities will also be documented with project photographs. Field samples (discussed in Section 8.2.6) will be collected by qualified personnel and transported under Chain-of-Custody documentation to laboratories licensed in the State of California.

#### 8.2.3 Excavation Plan

Excavation requirements are shown on Drawing C-1. An excavation plan will be developed by the excavation contractor in accordance to Drawing C-1. The excavation plan will provide for the efficient and safe coordination of removal, stockpiling, and loading for transport off-site of the Site soils that exceed health-based SSTLs.

Most excavations are less than 5-feet deep, although one excavation is planned to be 10-feet deep. The excavation contractor shall slope sidewalls such that shoring is not

required. Contractors shall also comply with all OSHA construction safety requirements, including confined space entry.

Each excavation area is defined by the constituents present. Stockpile areas are also defined to segregate waste types until the analytical results are received and disposal requirements are determined. Stockpiles shall be protected with anchored visqueen covers until loading and transportation activities begin.

The excavation contractor shall present an excavation plan, including order of excavations and traffic patterns, at the pre-construction meeting. The excavation contractor shall present their project-specific Health and Safety Plan at the pre-construction meeting.

#### 8.2.4 Air and Meteorological Monitoring

Air monitoring shall be conducted in accordance with the general Site-wide Health and Safety Plan presented in Appendix A, in order to determine the total air borne particulate concentrations encountered during soil excavation so as to maintain acceptable breathing zone concentrations. Results of this air monitoring will also be used to assess the effectiveness of the dust control measures to be implemented, as described in Section 8.2.5.

The contractor shall also be required to cooperate with up to three days of worker exposure air monitoring that may be conducted by FMC. This will entail attaching small air sample collection devices to worker clothing during work activities, as described in the Site-wide Health and Safety Plan.

The excavation contractor shall monitor upcoming weather conditions to avoid excavation activities during inclement weather. All stockpiles shall be covered with anchored visqueen each night. Excavations will not be permitted under wet conditions during and following a rain event. It is anticipated that field activities will be conducted during the dry season between May and October.

#### 8.2.5 Dust Control Plan

Dust control measures will be implemented to mitigate noticeable air borne particulates from the excavation, stockpiling, loading, and transporting activities. Dust control measures shall include, but not be limited to: using a water truck to spray sufficient water to control noticeable dust emissions, covering stockpiles, and covering excavated areas pursuant to SJVUAPCD Rule 8021 (Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities) and California Code of Regulations Title 8, Division 1, Chapter 4, Subchapter 4, Article 10, Section 1590 (Haulage and Earth Moving). Clean water shall be obtained from the on-site fire hydrant. The contractor shall be responsible for obtaining necessary approvals from the City of Modesto to use the fire hydrant.

#### 8.2.6 Confirmation Sampling

The confirmation soil sampling will be conducted in accordance with the Sampling and Analysis Plan presented in the *Remedial Investigation Work Plan, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California*. (RI Work Plan) (GeoTrans, 2002) and the *Addendum to the Remedial Investigation Work Plan, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California*, (Work Plan Addendum) (GeoTrans, Inc., 2003), as amended and accepted by DTSC in their May 28, 2003 letter to FMC, *Re.: Approval of the Remedial Investigation Work Plan for the FMC Modesto Site, Modesto, California*.

Excavations shall be made to the initial limits defined on Drawing C-1. A surveyor will define the limits of the excavation as presented in the field with appropriate off-set staking to allow reconstruction of the excavation limits by field personnel. A minimum of two confirmation grab soil samples shall be sampled from each side and bottom of the excavation. An additional grab sample shall be collected from the sidewalls for every 50 feet in excavation length and every 5 feet in excavation depth. An additional grab sample shall be collected from the excavation bottom for every 4,000 square-feet of area greater than 4,000 square-feet. An initial estimate of the number of samples is

shown on Drawing C-1. The samples shall be analyzed for the specific constituents that define the excavation to verify that soils above the SSTLs have been removed.

Stockpiles shall be sampled in accordance with landfill disposal requirements. It is anticipated that two composite samples shall be collected from each stockpile for the first 500 cubic yards. One additional composite sample shall be collected for each additional 500 cubic yards in the stockpile. Composite samples shall be developed from four grab samples collected at least two feet apart and from varying depths within the stockpile. The depths shall be 6, 12, 18, and 24 inches beneath the stockpile surface. Composite samples shall be prepared in the field and analyzed for the constituents that define the excavated area. Additional samples may be collected to verify or refine the waste classification results of the stockpile sampling.

#### 8.2.7 Transportation Plan for Off-Site Disposal

This subsection provides guidelines for contractors to transport excavated soil in a safe and expeditious manner to the appropriate landfill facility. Contractors shall comply with all OSHA requirements on the management of hazardous waste.

Following waste classification, stockpiled soils shall be loaded into haul trucks for transport to the appropriate landfill. Transport trucks shall enter the property from the gated entrance on Graphics Drive. The contractor shall construct a decontamination pad near the parking lot, as shown on Drawing C-1. The pad shall be constructed of a 6-inch thickness of crushed stone with a nominal size of 1 to 2 inches in diameter. The stone shall be placed after rough grading the exit location for on-site hauling activities. All equipment that comes in contact with impacted soils shall be decontaminated prior to leaving the site and returning to public roadways. Dust control measures shall be implemented during loading and transport activities. After all equipment has been decontaminated, the decontamination pad shall be excavated and removed.

Based on available Site characterization soil sampling, approximately 190 truckloads of soil will be transported to a Class I Landfill, such as the Kettleman Hills Landfill. This is based on an estimated 4,400 tons of barium and PAH impacted soil above the health-

based SSTLs, and a haul capacity of 23 tons per truckload. Similarly, it is estimated that approximately 60 truckloads will be required to transport the estimated 1,300 tons of non-hazardous soil to a Class II landfill, such as the Altamont Landfill. Approximately six weeks of hauling operations will be required, based on an estimated loading of 10 truckloads per day. The transportation company will be requested, when scheduling trucks, to coordinate dispatch to minimize shipments during peak traffic hours.

Specific travel routes from the Site to the Class I (Kettleman Hills) and Class II (Altamont) landfills that are contemplated to be used, are shown on Figures 3 and 4, respectively. Each route uses major highways and freeways to the greatest extent practical to achieve the shortest expected driving time. Alternative routes to avoid highly populated or otherwise sensitive areas were considered unnecessary because of the benign nature of the haul materials.

The contractor shall be responsible for staffing and conducting the loading and hauling operations in an efficient manner. Transport trucks shall haul impacted soil in accordance with all local, state, and federal regulations. FMC will be listed as generator on the manifest forms.

#### 8.2.8 Backfill and Restoration Plan

The purpose of the backfill and restoration plan is to return the Site to a safe condition following the excavation activities. This subsection outlines the plan to restore the Site without significantly altering the Site drainage patterns that currently exist.

The shallow excavated areas (<3 feet deep) shall be backfilled by cutting down the sidewalls and filling toward the center of the excavation. The contractor shall backfill excavations to the general existing grade to prevent ponding. The filled areas shall be compacted in one-foot maximum lifts to 95% relative density. All fill and excavated areas shall be rolled smooth in preparation for surface restoration.

Surface restoration is needed as a dust control measure prior to Site development activities. Surface restoration is not required if development activities are to begin within 90 days after the soil removal. A vegetative cover shall be applied if a surface

restoration is needed.

Vegetative restoration of the excavated areas shall be provided by hydro-seeding the disturbed areas with a low-cost seed mixture designed to match the existing native grasses existing at the Site. The seeded areas shall be stabilized with straw and hay mulch at an application rate of 1,500 pounds per acre to a uniform thickness, and anchoring with wood cellulose fiber mulch sprayed at a rate of 600 to 750 pounds per acre.

### ***8.3 Project Management***

FMC will be responsible for the soil removal activities. Contractors and laboratories will conduct the work under the direction of FMC or a general contractor retained by FMC. The work will be coordinated with DTSC, RWQCB, and the City of Modesto Redevelopment Agency.

## **9.0 IMPLEMENTATION SCHEDULE**

It is anticipated that the soil removal field activities will require approximately two to three months. Following the pre-construction meeting, approximately one week will be required to mobilize to the Site and set construction staking to define the excavation limits. Excavating and stockpiling will require approximately one week. Testing the stockpiles will be conducted with a one week turnaround. Loading and hauling the soils to the designated landfills will require approximately six weeks. Backfilling will be completed concurrently with the loading and hauling activities.

A project completion report will be prepared to document the soil removal activities. This report should be completed approximately four weeks after the completion of loading, hauling, and disposal activities.

## 10.0 REFERENCES

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USEPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. October 1988.

**Table 1**  
**ARARs and TBCs for Soil Remediation FMC Corporation**  
**1200 Graphics Drive, Modesto, Stanislaus County, California**

<b>Source</b>	<b>Standard, Requirement, Criterion, or Limitation</b>	<b>Description</b>	<b>ARARs, or To Be Considered</b>	<b>Chemical-Action-, or Location-Specific</b>	<b>Comments</b>
Porter-Cologne Water Quality Control Act (California Water Code Sections 13240, 13241, 13242, 13243)	Water Quality Control Plan (Basin Plan) for the RWQCB, CVR.	<p>Establishes water quality objectives, including narrative and numerical standards, that protect the beneficial uses of surface and ground waters in the region. Describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provide comprehensive water quality planning. Also includes implementation actions for setting soil cleanup levels for soils which threaten water quality.</p> <p>Unless otherwise designated by the Regional Water Board, all ground waters in the Region are considered as suitable or potentially suitable, at a minimum, for municipal and domestic water supply (MUN), agricultural supply (AGR), industrial service supply (IND), and industrial process supply (PRO).</p>	Applicable	Chemical	Specific applicable portions of the Basin Plan include beneficial uses of affected water bodies and water quality objectives to protect those uses. Any activity, including, for example, a new discharge of contaminated soils or in-situ treatment or containment of contaminated soils, that may affect water quality must not result in water quality exceeding water quality objectives. Implementation plans and other policies and requirements may also apply.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13304, 13240, 13241, 13242, 13243)	RWQCB, CVR Basin Plan, "Policy for Investigation and Cleanup of Contaminated Sites."	Establishes and describes policy for investigation and remediation of contaminated sites. Also includes implementation actions for setting groundwater and soil cleanup levels.	Applicable	Chemical	Cleanup levels for soils should be equal to levels that would achieve background concentrations in groundwater unless such levels are technically and economically infeasible to achieve. In such cases, soil cleanup levels are such that groundwater will not exceed applicable groundwater quality objectives.

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Porter-Cologne Water Quality Control Act (California Water Code Sections 13240, 13241, 13242, 13243)	RWQCB, CVR Basin Plan, "Policy for Application of Water Quality Objectives"	This policy defines water quality objectives and explains how the Regional Water Board applies numerical and narrative water quality objectives to ensure the reasonable protection of beneficial uses of water and how the Regional Water Board applies Resolution No. 68-16 to promote the maintenance of existing high quality waters.	Applicable	Chemical	Applies to all cleanups of discharges that may affect water quality.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13263, 13304)	State Water Resources Control Board Resolution No. 68-16 ("Antidegradation Policy")	Requires that high quality surface and ground waters be maintained to the maximum extent possible. Degradation of waters will be allowed (or allowed to remain) only if it is consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial uses, and will not result in water quality less than that prescribed in RWQCB and SWRCB policies. If degradation is allowed, the discharge must meet best practicable treatment or control, which must prevent pollution or nuisance and result in the highest water quality consistent with maximum benefit to the people of the state.	Applicable	Chemical	Applies to discharges of waste to waters, including discharges to soil that may affect surface or ground waters. In-situ cleanup levels for contaminated soils must be set so that ground waters will not be degraded, unless degradation is consistent with the maximum benefit of the people of the state. If degradation is allowed, the discharge must meet best practical treatment or control, and result in the highest water quality possible consistent with the maximum benefit to the people of the state. In no case may water quality objectives be exceeded.
Porter-Cologne Water Quality Control Act (California Water Code Sections	State Water Resources Control Board Resolution No. 92-49 (As	Establishes requirements for investigation and cleanup and abatement of discharges. Among other requirements, dischargers must clean up and abate the effects of discharges in a manner that	Applicable	Chemical	Applies to all cleanups of discharges that may affect water quality.

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13000, 13140, 13240, 13260, 13263, 13267, 13300, 13304, 13307)	amended April 21, 1994)	promotes the attainment of either background water quality, or the best water quality that is reasonable if background water quality cannot be restored. Requires the application of Title 23, CCR, Section 2550.4 requirements to cleanups.			
Porter-Cologne Water Quality Control Act (California Water Code Sections 13000, 13140, 13240)	State Water Resources Control Board Resolution No. 88-63 ("Sources of Drinking Water Policy") (as contained in the RWQCB's Water Quality Control Plan)	Specifies that, with certain exceptions, all ground and surface waters have the beneficial use of municipal or domestic water supply.	Applicable	Chemical	Applies in determining beneficial uses for waters that may be affected by dischargers of waste.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13260, 13263, 13370.5, 13372, 13373, 13374, 13375, 13376, 13377, 13383).	40 CFR Parts 122, 123, 124, National Pollutant Discharge Elimination System, implemented by California Storm water Permit for Industrial Activities, State Water Resources Control Board Order #97-03-DWQ.	Regulates pollutants in discharge of storm water associated with hazardous waste treatment, storage, and disposal facilities, wastewater treatment plants, landfills, land application sites, and open dumps. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards.	Applicable	Action and Chemical	Applies to storm water discharges from industrial areas. Includes measures to minimize and/or eliminate pollutants in storm water discharges and monitoring to demonstrate compliance.

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Porter-Cologne Water Quality Control Act (California Water Code Sections 13260, 13263, 13370.5, 13372, 13373, 13374, 13375, 13376, 13377, 13383).	40 CFR Parts 122, 123, 124, National Pollutant discharge elimination system, implemented by State Water Resources Control Board Order No. 92-08 DWQ	Regulates pollutants in discharge of storm water associated with construction activity (clearing, grading, or excavation) involving the disturbance of 5 acres or more. Requirements to ensure storm water discharges do not contribute to a violation of surface water quality standards.	Applicable	Action and Chemical	Applies to construction areas over 5 acres in size. Includes measures to minimize and/or eliminate pollutants in storm water discharges and monitoring to demonstrate compliance.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304).	Title 27, CCR, Section 20080(g), Title 23, CCR, Section 2510(g)	Requires monitoring. If water quality is threatened, corrective action consistent with Title 27, Title 23 is required.	Applicable	Action	Applies to areas of land where discharges had ceased as of November 27, 1984 (the effective date of the revised Title 27/ Title 23 regulations).
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20385, Title 23, CCR, Section 2550.1	Requires detection monitoring. Once a significant release has occurred, evaluation or corrective action monitoring is required.	Applicable	Action and Chemical	Applies to all areas in which waste has been discharged to land to determine the threat to water quality.

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<b>Source</b>	<b>Standard, Requirement, Criterion, or Limitation</b>	<b>Description</b>	<b>ARARs, or To Be Considered</b>	<b>Chemical-Action-, or Location-Specific</b>	<b>Comments</b>
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20390, Title 23, CCR, Section 2550.2	Requires establishment of a water quality protection standard consisting of a list of constituents of concern, concentration limits, compliance monitoring points and all monitoring points. This section further specifies the time period that the standard shall apply.	Applicable	Action and Chemical	Applies to all areas in which waste has been discharged to land where groundwater is threatened.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20395, Title 23, CCR, Section 2550.3	Requires development of a list of constituents of concern which include all waste constituents, that are reasonably expected to be present in the soil from discharges to land, and could adversely affect water quality.	Applicable	Chemical	Applies to all areas in which waste has been discharged to land where groundwater is threatened.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20400, Title 23, CCR, Section 2550.4	Concentration limits must be established for groundwater, surface water, and the unsaturated zone. Must be based on background, equal to background, or for corrective actions, may be greater than background, not to exceed the lower of the applicable water quality objective or the concentration technologically or economically achievable. Specific factors must be considered in setting cleanup standards above background levels.	Relevant and Appropriate	Action	If water quality is threatened, this section applies in setting soil cleanup levels for all cleanups of discharges of waste to land.
Porter-Cologne Water Quality Control Act (California Water	Title 27, CCR, Section 20405, Title 23, CCR, Section 2550.5	Requires identification of the point of compliance, hydraulically down gradient from the area where waste was discharged to land.	Applicable	Action	Applies to all areas in which waste has been discharged to land where groundwater is threatened.

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Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).					
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20410 Title 23, CCR, Section 2550.6	Requires monitoring for compliance with remedial action objectives for three years from the date of achieving cleanup levels.	Relevant and Appropriate.	Action	Applies to all soil cleanup activities.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20415 Title 23, CCR, Section 2550.7.	Requires general soil, surface water, and ground water monitoring.	Relevant and Appropriate.	Action	Applies to all areas in which waste has been discharged to land.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147,	Title 27, CCR, Section 20420, Title 23, CCR, Section 2550.8.	Requires detection monitoring to determine if a release has occurred.	Applicable	Chemical	Applies to all areas where waste has been discharged to land and groundwater is threatened.

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13172, 13260, 13263, 13267, 13269).					
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20425 Title 23, CCR, Section 2550.9	Requires an assessment of the nature and extent of the release, including a determination of the spatial distribution and concentration of each constituent.	Applicable	Chemical	Applies to sites at which monitoring results show statistically significant evidence of a release.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20430 Title 23, CCR, Section 2550.10 Title 27, CCR, Section 20430 Title 23, CCR, Section 2550.10	Requires implementation of corrective action measures that ensure that cleanup levels (i.e., water quality protection standard established under section 2550.2) are achieved throughout the zone affected by the release by removing the waste constituents or treating them in place. Source control may be required. Also requires monitoring to determine the effectiveness of the corrective actions.	Relevant and Appropriate	Action	If water quality is threatened, this section applies to all soil cleanup activities.
Cal EPA, DTSC	Preliminary Endangerment Assessment Guidance Manual	Provides guidance on performing standard risk assessments.	To Be Considered	Chemical	Performance standard on human health screening evaluation.
Office of Scientific Affairs, Cal EPA, DTSC	Supplemental Guidance for Human Health Multimedia Risk	Provides recommendations on specific technical or scientific issues that may be encountered when preparing multimedia risk assessment reports for submittal and	To Be Considered	Action	Performance standard for conducting quantitative human health risk assessments.

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	Assessment of Hazardous Waste Sites and Permitted Facilities	review by the DTSC			
Guidance	USEPA Risk Reference Doses (RfDs)	RfDs are dose levels developed USEPA for evaluating human non-carcinogenic risk from exposure to carcinogens.	To Be Considered	Chemical	RfDs are used to evaluate to evaluate human health risks from exposure to non-carcinogenic Site contaminants. RfDs are also employed to develop Site cleanup levels.
Guidance	USEPA Human Health Assessment Cancer Slope Factors (CSFs)	CSFs are developed by USEPA for evaluating incremental human carcinogenic risk from exposure to carcinogens.	To Be Considered	Chemical	CSFs are used to evaluate human cancer risk resulting from exposure to carcinogenic Site contaminants. CSFs are also employed to develop Site cleanup levels.
Staff Report of the RWQCB, CVR	The Designated Level Methodology for Waste Classification and Cleanup Level Determination	Provides guidance on how to classify wastes according to Title 27, CCR, Division 2, Subdiv.1/ Title 23, CCR, Division 3, Chapter 15, Article 10. Provides a methodology for establishing "Designated Levels" for specific constituents of a waste which provides a numerical value that would indicate the water quality impairment potential of the waste.	To Be Considered	Action	Performance standard to be considered in determining the classification of wastes and contaminated soils.
Staff Report of the RWQCB, CVR	"A Compilation of Water Quality Goals"	Provides guidance on selecting numerical values to implement narrative water quality objectives contained in the Basin Plan.	To Be Considered	Action	Performance standard to be considered in selecting appropriate numerical values to implement the Basin Plan for setting cleanup levels and discharge limits. The numerical

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					values contained in the staff report may be applicable, relevant and appropriate, or to be considered, depending on the source of the values.
Staff Report of the RWQCB, CVR	"Water Quality Site Assessment for Soils and Ground Water"	Provides guidance on how a site-wide water quality site assessment should be conducted to evaluate the impact of soil contaminants on groundwater quality. Guidance uses background soil and groundwater quality data to determine if Site soil and groundwater have been impacted by site activities and uses groundwater Water Quality Goals to determine if the beneficial use of groundwater has been impacted or whether concentrations of site constituents have the potential to affect beneficial groundwater uses.	To Be Considered	Action	Used to determine to identify Site soil and groundwater constituents of concern.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13269).	Title 23, CCR, Section, 2520, 2521	Requires that hazardous waste be discharged to Class I waste management units that meet certain design and monitoring standards.	Relevant and Appropriate	Action	Applies to discharges of hazardous waste to land for treatment, storage or disposal.
Porter-Cologne Water Quality Control Act (California Water Code Sections	Title 27, CCR, Section, 20200(c), 20210	Requires that designated waste be discharged to Class I or Class II waste management units.	Relevant and Appropriate	Action	Applies to discharges of designated waste (nonhazardous waste that could cause degradation of surface or ground waters) to land for treatment,

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13140-13147 13172, 13260, 13263, 13269).					storage, or disposal.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147 13172, 13260, 13263, 13269).	Title 27, CCR, Section 20230	Requires that inert waste does not need to be discharged at classified units.	Relevant and Appropriate	Action	Applies to discharges of inert waste to land for treatment, storage, or disposal.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13269).	Title 27, CCR, Section 20200(c),20220	Requires that nonhazardous solid waste be discharged to a classified waste management unit.	Relevant and Appropriate	Action	Applies to discharges of nonhazardous solid waste to land for treatment, storage, or disposal.

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Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147,, 13172, 13260, 13263, 13267, 13304).	Title 27, CCR, Section 20090(d) Title 23 CCR, Section 2511(d)	Actions taken by public agencies to cleanup unauthorized releases are exempt from Title 27/Title 23 except that wastes removed from immediate place of release and discharged to land must be managed in accordance with classification (Title 27 CCR, Section 20200/ Title 23 CCR, Sections 2520) and siting requirements of Title 27 or Title 23 and wastes contained or left in place must comply with Title 27 or Title 23 to the extent feasible.	Applicable	Action	Applies to remediation and monitoring of sites.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13304).	Title 27, CCR, Section 20080 (d) Title 23, CCR, Section 2510(d)	Requires closure of existing waste management units according to Title 27/Title 23.	Applicable	Action	Applies to existing waste management units (i.e., areas where waste was discharged to land on or before 27 November 1984, but that were not closed, abandoned, or inactive prior to that date).
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 1323, 13269).	Title 27, CCR, Section 21400, Title 23, CCR, Section 2582.	Requires surface impoundments to be closed by removing and treating all free liquid and either removing all remaining contamination or closing the surface impoundment as a landfill.	Applicable	Action	If water quality is threatened, this section is relevant and appropriate for natural topographic depressions, excavations, and diked areas where wastes containing free liquids were discharged.

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Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Sections 20385-20435 Title 23, CCR, Section 2550 .	Where groundwater monitoring is required under 2510 or 2511 of Ch 15 (and equivalent for Title 27), applies to authorized waste management units as well as unauthorized discharges of waste to land and to closed abandoned or inactive units.	Applicable	Chemical and Action	Applies to all areas in which waste has been discharged to land to determine the threat to water quality.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269).	Title 27, CCR, Section 20950; 22207 (a); 22212 (a), and 22222. Title 23, CCR, Section 2550.0 (b); 2580; 2580(f).	General closure requirements, including continued maintenance of waste containment, drainage controls, and groundwater monitoring throughout the closure and post closure maintenance periods.	Applicable	Action	Applies to partial or final closure of waste management units.
Porter-Cologne Water Quality Control Act (California Water Code Sections 13140-13147, 13172, 13260, 13263, 13267, 13269)	Title 27, CCR, Section 21090	Requires a final cover for landfills constructed in accordance with specific prescriptive standards, to be maintained as long as wastes pose a threat to water quality.	Relevant and Appropriate	Action	If water quality is threatened, this section is relevant and appropriate for wastes contained or left in place at the end of remedial actions that could affect water quality. Includes closure of landfills and other areas where wastes have been discharged to land.
Staff Report of the RWQCB, CVR	Items to be included in a Feasibility	Provides an outline presenting the minimum requirement for items to be included and discussed in the text of all	To be Considered	Chemical, Action, and Location	Applies to preparation of a feasibility study and remedial options evaluation for submittal to

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	Study/Remedial Options Evaluation Report	feasibility studies/remedial option evaluation reports submitted to the RWQCB.			RWQCB.
Hazardous Waste Control Law (Health and Safety Code, Division 20, Chapter 6.5)	Title 22, California Code of Regulations, Division 4.5, Section 66260.1 et seq	Regulates the generation, storage, transportation, treatment and disposal of hazardous waste in the State.	Applicable	Chemical	Applies to material that may be hazardous waste.
Hazardous Waste Control Law (Health and Safety Code, Division 20, Chapter 6.5)	Title 22, California Code of Regulations, Division 4.5, 22 CCR §§66261-66261.126	Identifies those wastes that are subject to regulation as hazardous wastes. Provides definition of “wastes” and “hazardous wastes”.	Applicable	Chemical	Applies to material that would be transported from the Site for disposal, treatment or storage. Determination of material as “waste” and “hazardous waste” is required prior to removal from Site.
NCP	55 FR 8758-8760, March 8, 1990	Area of Contamination – Allows wastes to be consolidated and treated <i>in situ</i> within an AOC without triggering land disposal restrictions or minimum technology requirements. For an AOC, contamination must be contiguous but does not have to be homogeneous.	Relevant and Appropriate	Action	Allows for movement of impacted soil to be moved within the footprint of impacted soil.
City of Modesto	Municipal Code Section 5-10.301	Requires a grading and erosion control permit to grade, fill, excavation, store or dispose of 350 cubic yards or more of soil or earth material or clear and grub ore than .5 acre of land within the City limits.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil.
City of Modesto	Municipal Code Section 5-10.303	Provides requirements for information to be included in a grading and erosion control permit.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil.

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City of Modesto	Municipal Code Section 5-10.304	Provides requirements for grading plans required as part of the grading and erosion permit.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil.
San Joaquin Valley Unified Air Protection Control District	Rule 8021	Provides requirements for to limit fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities.	Applicable	Action	Would apply for remedial actions that included excavation of impacted soil. Permit is required if area subject to construction, demolition, etc is greater than five acres.
National Contingency Plan (40 CFR Part 300.430)	USEPA's regulations for implementing CERCLA	Identifies the development and evaluation process for remedial alternatives.	Relevant and Appropriate	Action	Applies to investigation and remediation of uncontrolled hazardous waste sites.
USEPA	Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, October 1988, (EPA/540-G-89/004	Presents the methodology that the Superfund program has established for characterizing the nature and extent of risks posed by uncontrolled hazardous waste sites and for evaluating potential remedial options.	To be Considered	Action	<i>Voluntary Cleanup Agreement, FMC-Modesto Site, Stanislaus County, Modesto, California</i> requires the RI/FS Process to follow CERCLA guidance, specifically this guidance document.

**Table 2**  
**Screening of Remedial Technologies for Soils above Health-Based SSTLs**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Remedial Action Technology	Description	Effectiveness	Implementability	Relative Cost	Appropriate for Further Consideration?
No Action	No action	Does not prevent potential direct contact.	Easy	Low	Yes, as a baseline for comparison with other alternatives. Required for consideration by NCP.
<b>Institutional Actions</b>					
Site Access Restrictions	Institutional actions (security, fencing) would be maintained to reduce potential of exposure to population.	Reduces potential for direct contact.	Easy	Low	No, not consistent with land use plans.
Deed Restrictions	Institutional actions (that include worker training/hazard communication, zoning) would be maintained to reduce potential of exposure to population.	Reduces potential for direct contact. Restricts land use options.	Easy	Low	Yes
<b>Containment</b>					
Cap	Impermeable structure that satisfies specific construction and performance standards.	Prevents direct contact. Would not be able to build on a capped area.	Moderate	High	No, not consistent with land use plans.
Subsurface Vertical Barriers	Impacted soils isolated by installation of slurry cutoff wall, grout curtain, or sheet pile wall.	Does not prevent direct contact. Isolates impacted soil. Difficult to construct.	Difficult	High	No, impacted area and depth are too large to be practical.
Subsurface Horizontal Barriers	Impacted soils isolated by installation by permeation grouting and jet grouting of horizontal barriers.	Does not prevent direct contact to surface contaminants. Requires verification that the barrier forms a continuous barrier. Would require vertical barriers.	Difficult	High	No, impacted area is too large to be practical.
Dust Controls	Temporary dust control measures (vegetative coverings, barriers, calcium, chloride, adhesives, water) to control dust during preconstruction and construction and permanent dust control measures (vegetative coverings, stone, top soiling) for post construct	Does not prevent direct contact.	Moderate	Low	No, not a long-term remedy.

**Table 2**  
**Screening of Remedial Technologies for Soils above Health-Based SSTLs**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Remedial Action Technology	Description	Effectiveness	Implementability	Relative Cost	Appropriate for Further Consideration?
<b>Treatment</b>					
Physical Treatment - Stabilization	Application of binding agent (cement, lime, fly ash, polymers) to reduce mobility of constituents.	Prevents direct contact. Would require treatability study to confirm effectiveness for all constituents.	Difficult	High	No, unlikely to be effective for the mixture of constituents, and the long implementation schedule is not consistent with development plans.
Physical Treatment - Soil Flushing	Soluble contaminants are flushed from soil by injecting and collecting water and elutriate.	Not applicable or appropriate for surficial soils that exceed health-based SSTLs.	Difficult	High	No, impractical to implement on a large scale; would not allow site development.
Physical Treatment - Soil Washing	Soil washing separates the silt and clay and soluble constituents from the larger-grained, cleaner soils.	Soil washing treatments have not been shown effective for the mixture of Site constituents.	Difficult	High	No, residual waste products difficult to manage, not effective on all constituents, and implementation schedule is not consistent with development plans.
Chemical Treatment	Chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, or inert.	Chemical treatments have not been shown effective for the mixture of Site constituents.	Difficult	High	No, not effective on all constituents, and implementation schedule is not consistent with development plans.
Biological Treatment	Indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) metabolize constituents are introduced into impacted media, with nutrients, oxygen, or other amendments, converting them to innocuous end products.	Biological treatments have not been shown to be effective for the complete mixture of Site constituents in soil.	Difficult	High	No, not efficient to use on small volume of TPH impacted soils, not effective on other constituents.
Thermal Treatment	Impacted soil is heated to volatilize organic contaminants.	Thermal treatments have not been shown to be effective for all Site constituents in soil.	Difficult	High	No, not effective on all constituents, and implementation schedule is not consistent with development plans.
<b>Removal</b>					
On-Site Landfill	Soil excavated and contained on-site in landfill.	Eliminates all exposure pathways.	Difficult	High	No, creates a long-term liability at the property; public acceptance and permitting would be difficult; not consistent with development plans
Off-Site Disposal	Soil excavated and transported off-site for disposal.	Eliminates all exposure pathways.	Moderate	Moderate	Yes

**Table 3**  
**Approximate Volumes of Soils with**  
**Concentrations Above Health-Based SSTLs**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Constituent Designation	Location Designation	Impacted Surface Area (ft <sup>2</sup> )	Depth Interval (ft)	Depth (ft)	In-Place Volume (cy)	Excavated Volume <sup>(1)</sup> (cy)	Tons <sup>(2)</sup>	Subtotals (tons)
Barium > 58,400 mg/kg	Ba #1	5,253	0.5 to 1.0	1	195	253	428	1,311
	Ba #2	6,313	0.5 to 1.0	1	234	304	514	
	Ba #3	4,520	0.5 to 1.0	1	167	218	368	
PAHs: B(a)P TEQ > 1.2	PAH #1	39,519	0 to 1	1	1,464	1,903	2,488	2,895
	PAH #2	3,445	1 to 2	1	148	193	252	
	PAH #3	2,454	0 to 1	1	91	118	155	
TPH > 1,000 mg/kg	TPH #1	750	0 to 1	1	28	36	47	47
Arsenic > 27 mg/kg	As #1	4,525	0 to 1	1	168	218	285	1,311
	As #2	2,700	1 to 5	4	400	520	680	
	AS #3	1,100	5 to 10	5	204	265	346	
<b>Totals</b>		63,334			3,098	4,027	5,564	5,564

(1) 30% fluff factor used to estimate the excavated volume.

(2) Barium impacted soil estimated density = 165 lb/ft<sup>3</sup>

Other impacted soils estimated density = 125 lb/ft<sup>3</sup>

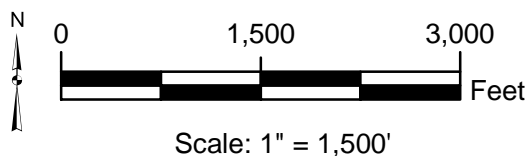
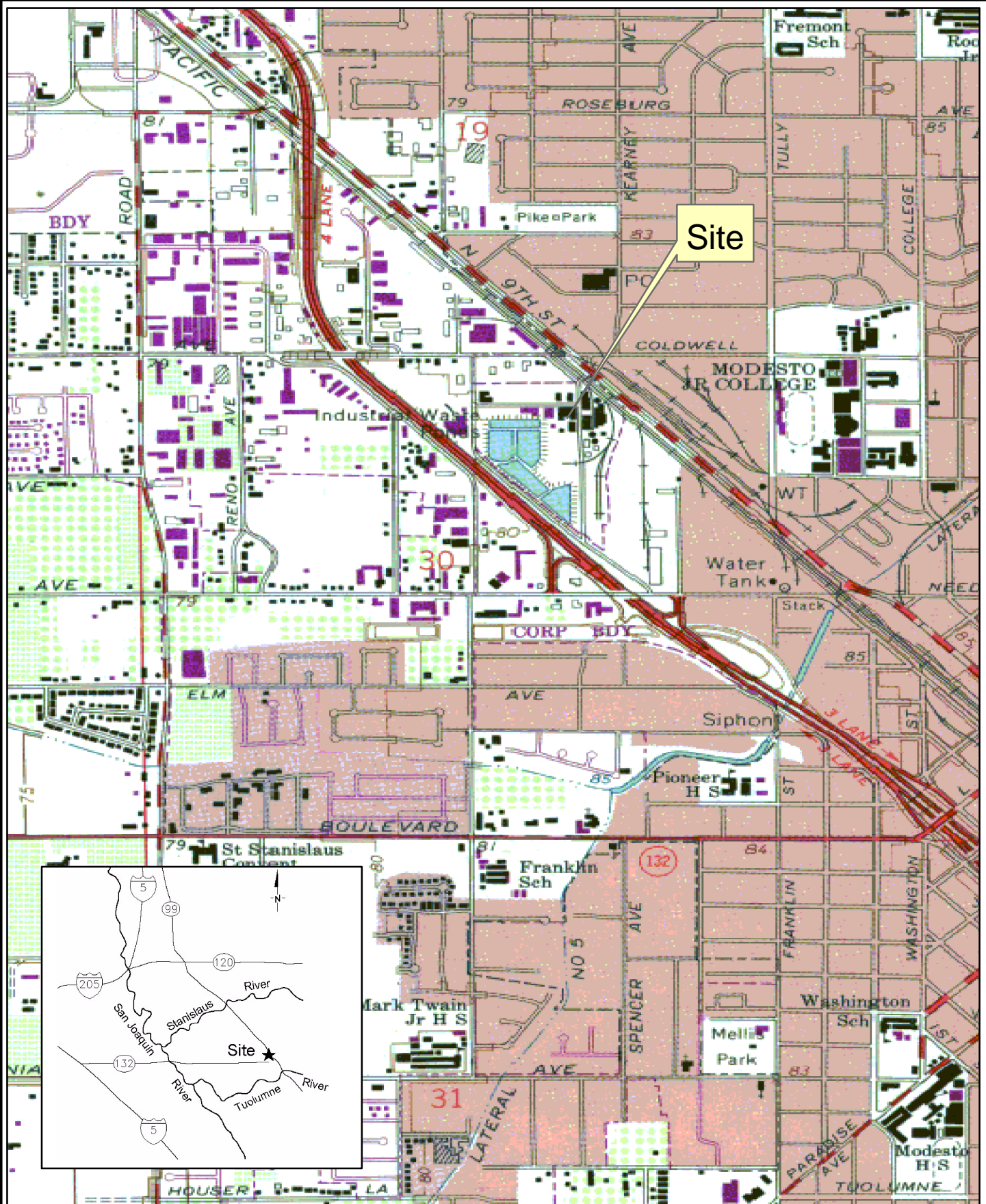
(3) Impacted Surface Area total omits PAH #2, As #2, and As #3, which are subsurface areas.

**Table 4**  
**Estimated Capital Costs, Soil Removal**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Component	Quantity	Units	Unit Rate	Costs (\$)
<b>Soil Removal</b>				
Excavation, Stockpiling, and Loading	5,700	tons	10	57,000
Hauling and Disposing - Non Hazardous	1,323	tons	30	40,000
Hauling and Disposing - non-RCRA Hazardous	4,377	tons	70	306,000
Analytical Testing	128	samples	100	13,000
Documentation and Reporting	1	each	20,000	20,000
<b>Subtotal</b>				<b>436,000</b>
Contingency	25%			<b>109,000</b>
<b>Soil Removal - Construction Subtotal</b>				<b>\$545,000</b>
Haz Waste Fee (CA Board of Equalization)	1	LS	70,000	<b>70,000</b>
Project Management	6%			<b>32,700</b>
Remedy Design and Const. Management	20%			<b>109,000</b>
Regulatory Oversight	5%			<b>27,250</b>
<b>Soil Removal -Total Estimated Capital Costs</b>				<b>\$780,000</b>

Assumptions:

- TPH and As impacts are non-hazardous for disposal purposes
- Ba and PAHs are non-RCRA hazardous materials for disposal purposes



Salida, California Quadrangle  
USGS, 1969 (Rev. 1987) 37121-FI-TF-024

## Vicinity Map

LOCATION

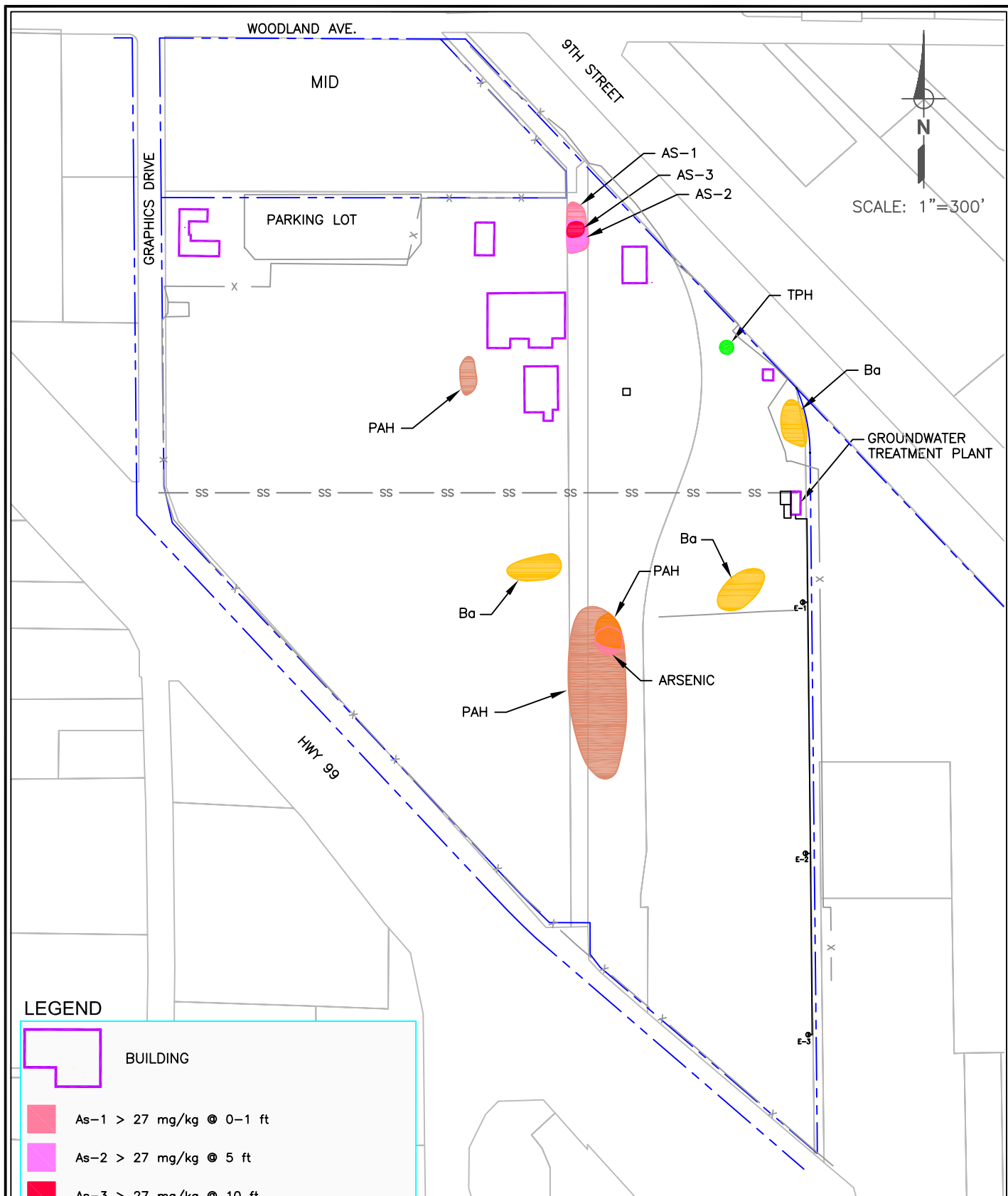
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California



CHECKED BY	Jennifer Abrahams
DRAFTED BY	Scott Flory
FILE	Figure1-1.mxd
DATE	2/14/2003

FIGURE:

1



# LEGEND

	BUILDING
	As-1 > 27 mg/kg @ 0-1 ft
	As-2 > 27 mg/kg @ 5 ft
	As-3 > 27 mg/kg @ 10 ft
	Ba > 58,000 mg/kg @ 0.5-1 ft
	PAH with B(a)P TEQ > 1.2 mg/kg @ 0-1 ft
	PAH with B(a)P TEQ > 1.2 mg/kg @ 1-2 ft
	TPH > 1,000 mg/kg @ 0.5 ft

bgs - BELOW GROUND SURFACE

TITLE:

## Approximate Areas of Soils with Concentrations Above Heath-Based SSTLs

LOCATION:

FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

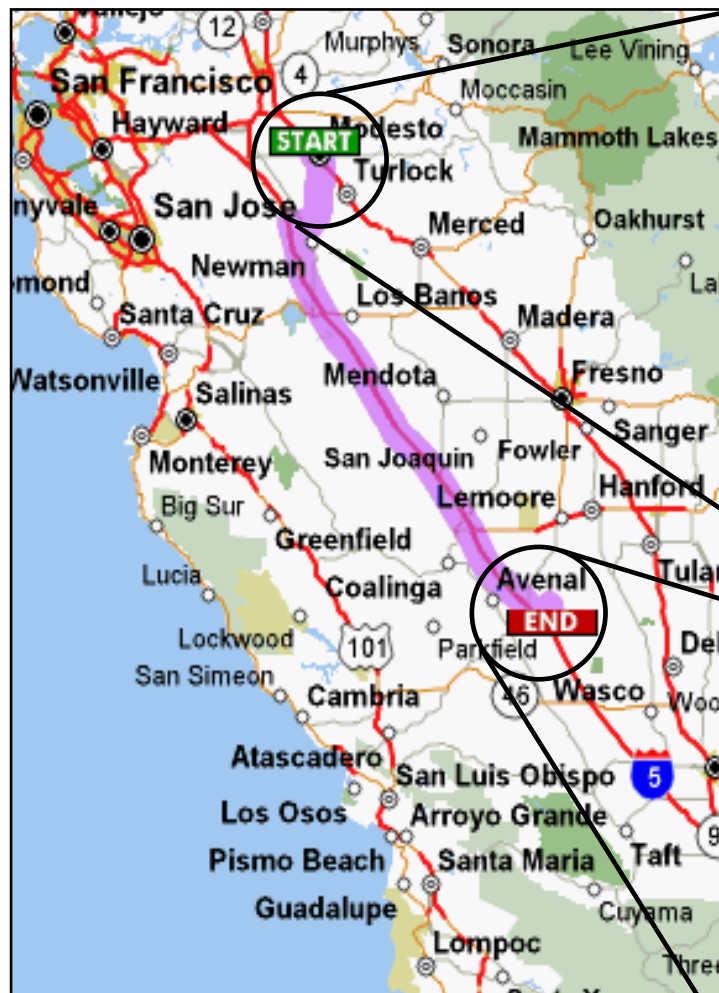


**GeoTrans, Inc.**

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DATE:	10/05

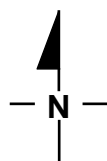
FIGURE:

2



## Directions to Kettleman Hills Landfill:

1. South on CA-99  
2.4 miles
2. South on  
Crows Landing Rd.  
17.6 miles
3. West on Fink Rd.  
3.9 miles
4. South on I-5  
120 miles
5. South on CA-41  
6 miles
6. Right turn at  
35251 Old Skyline Rd.



TITLE:

**Travel Route to Kettleman Hills Landfill**

LOCATION:

**FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California**



CHECKED:	JAA
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FILE:	2203.078.01
DATE:	03/01/06

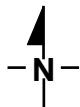
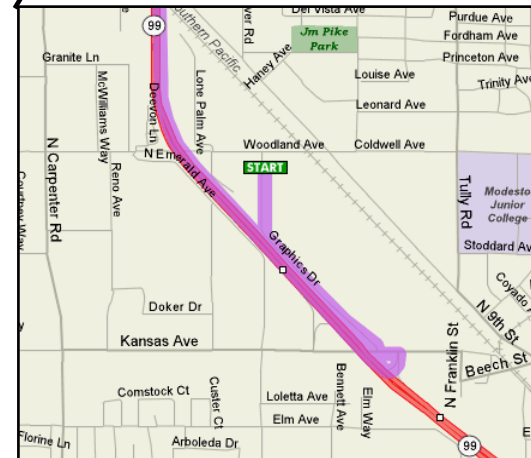
FIGURE:

**3**



### Directions to Altamont Landfill:

1. North on CA-99  
13.3 miles
2. West on CA-120  
6.5 miles
3. South on I-5  
2.3 miles
4. West on I-205  
14.0 miles
5. Grant Line Road exit  
North on Grant Line Rd  
0.3 miles
6. West on Altamont Pass Rd.  
4.6 miles



TITLE:

### Travel Route to Altamont Landfill

LOCATION:

**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**



CHECKED:	JAA
DRAFTED:	JB
FILE:	2203.078.01
DATE:	03/01/06

FIGURE:

**4**

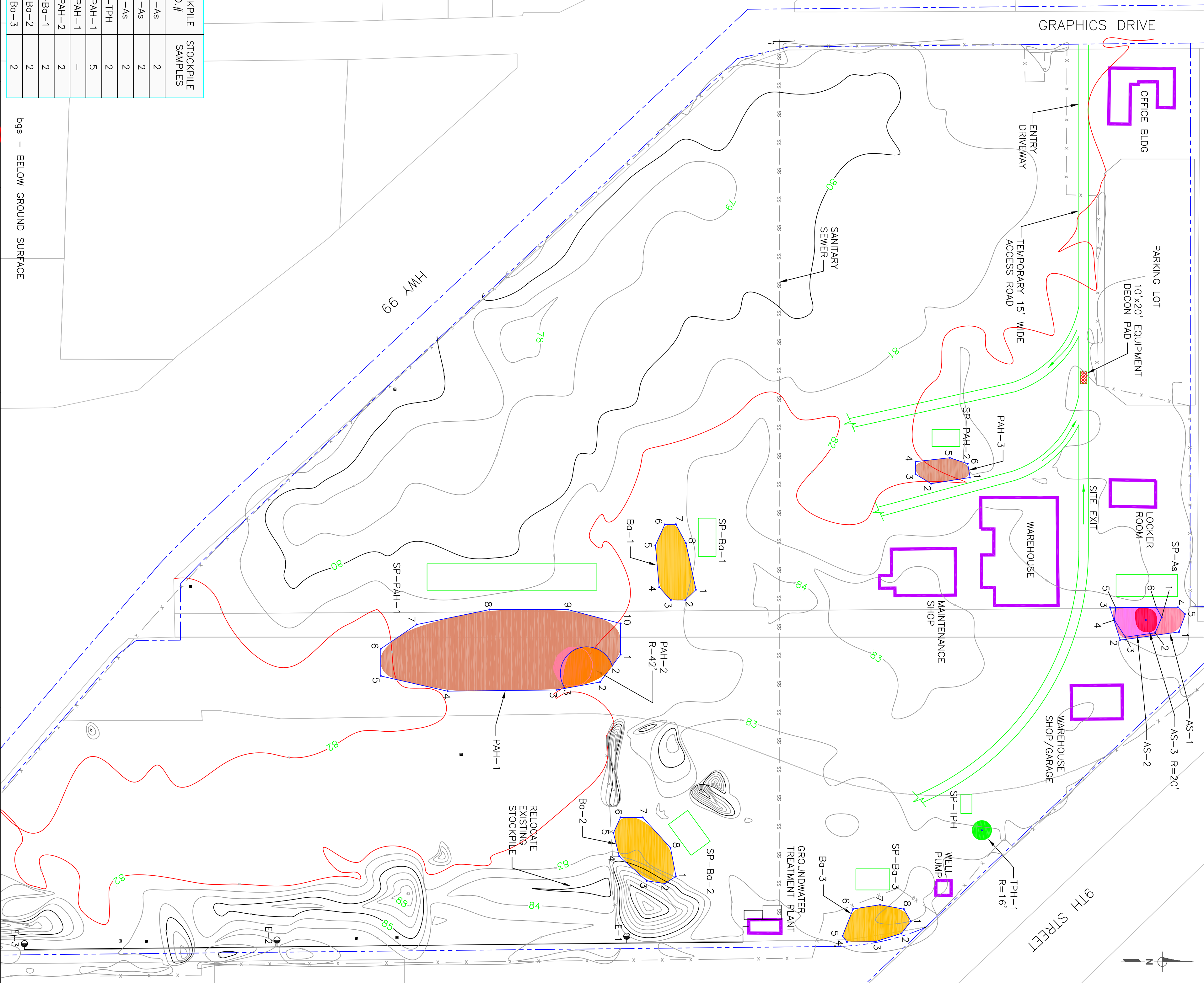
EXCAVATION TABLE

EXCAVATION AREA ID	SURVEY POINT	NORTHING	EASTING
As-1	1	2060322.52	6411768.89
	2	2060229.79	6411781.76
	3	2060213.60	6411730.00
	4	2060320.80	6411730.00
	5	2060332.46	6411741.08
As-2	1	2060295.31	6411745.65
	2	2060284.94	6411770.27
	3	2060237.94	6411777.10
	4	2060220.72	6411750.12
	5	2060222.74	6411730.47
	6	2060287.00	6411730.40
As-3	R=20'	2060270.25	6411750.02
TPH-1	R=16'	2060011.52	6412081.93
PAH-1	1	2059441.16	6411804.70
	2	2059408.77	6411848.00
	3	2059340.08	6411860.44
	4	2059168.06	6411862.33
	5	2059062.69	6411838.39
	6	2059062.69	6411795.45
	7	2059119.25	6411757.20
	8	2059234.20	6411733.57
	9	2059358.25	6411733.57
	10	2059441.16	6411755.51
PAH-2	1	2059387.90	6411834.04
	2	2059427.85	6411822.11
	3	2059353.11	6411857.02
PAH-3	1	2059992.86	6411525.01
	2	2059931.43	6411534.73
	3	2059906.92	6411519.91
	4	2059905.81	6411499.93
	5	2059960.75	6411493.80
	6	2059989.16	6411503.19
Bo-1	1	2059560.23	6411702.09
	2	2059453.42	6411718.46
	3	2059520.53	6411718.34
	4	2059502.15	6411698.30
	5	2059496.18	6411632.18
	6	2059511.05	6411599.10
	7	2059528.47	6411598.84
	8	2059544.37	6411628.85
Bo-2	1	2059528.67	6412154.79
	2	2059511.20	6412166.00
	3	2059482.63	6412161.84
	4	2059438.97	6412122.77
	5	2059430.02	6412086.14
	6	2059441.14	6412061.72
	7	2059476.12	6412061.72
	8	2059520.06	6412109.74
Bo-3	1	2059899.49	6412225.80
	2	2059884.49	6412244.93
	3	2059843.20	6412257.87
	4	2059798.62	6412258.26
	5	2059791.63	6412248.73
	6	2059808.25	6412206.29
	7	2059850.84	6412199.57
	8	2059888.38	6412206.49

TABLE 1

L.D.	SURFACE AREA (FT <sup>2</sup> )	DEPTH (FT)	IN-PLACE VOLUME (CY)	MINIMUM NO. OF CONFIRMATION SAMPLES	STOCKPILE ID #	STOCKPILE SAMPLES
As-1	4,806	0-1'	170	9	2	2
As-2	2,807	1-5'	390	6	2	2
As-3	1,080	5-10'	200	4	2	2
TPH-1	736	0-1'	50	4	2	2
PAH-1	40,898	0-1'	1,470	21	12	5
PAH-2	3,450	0-2'	130	4	2	-
PAH-3	2,665	0-1'	90	7	2	2
Bo-1	5,472	0-1'	200	10	3	2
Bo-2	6,747	0-1'	240	8	3	2
Bo-3	4,740	0-1'	170	8	2	2

bgs - BELOW GROUND SURFACE



NOTES:

1. THE BASIS OF BEARING FOR THIS SURVEY IS THE NORTH WEST LINE OF THE 45.02 ACRE PARCEL AS SHOWN ON THE RECORD OF SURVEY RECORDED IN THE STANISLAUS COUNTY RECORDERS OFFICE ON MAY 16, 1985. MAP NUMBER 16-S-70.
2. THE BENCHMARK USED FOR THIS SURVEY IS BENCHMARK NUMBER 10158, CHISELED SQUARE LOCATED ON THE CURB RETURN AT THE SOUTH EAST CORNER OF WOODLAND DRIVE AND GRAPHICS DRIVE. ELEVATION = 82.36'.
3. THE ELEVATIONS DISPLAYED ARE IN FEET ABOVE MEAN SEA LEVEL. THE CONTOUR INTERVAL IS 1 FOOT.
4. CONDUCT WORK IN ACCORDANCE WITH REMOVAL ACTION WORKPLAN (RAW), AS PROVIDED BY FMC WITH THIS CONTRACT DRAWING.
5. ATTEND PRE-CONSTRUCTION MEETING APPROXIMATELY ONE WEEK BEFORE FIELD ACTIVITIES ARE SCHEDULED TO BEGIN.
6. PROVIDE EXCAVATION PLAN, WORK SCHEDULE, AND PROJECT-SPECIFIC HEALTH AND SAFETY PLAN AT THE PRE-CONSTRUCTION MEETING.
7. CONDUCT SITE VISIT AND BE FAMILIAR WITH EXISTING CONDITIONS PRIOR TO BIDDING ON THE SCOPE OF WORK.
8. PROTECT ALL EXISTING STRUCTURES AND FACILITIES UNLESS WRITTEN PERMISSION IS PROVIDED BY FMC.
9. CONTRACTOR IS RESPONSIBLE FOR ANY REPAIRS AND ANY OTHER COMPENSATION THAT MAY BE REQUIRED DUE TO DAMAGES CAUSED BY CONTRACTOR OPERATIONS.
10. PROVIDE LICENSED SURVEYOR TO DEFINE THE EXCAVATION LIMITS IN THE FIELD WITH APPROPRIATE OFF-SET STAKING TO ALLOW RECONSTRUCTION OF THE EXCAVATION LIMITS BY FIELD INSPECTORS.
11. LOCATE SUBSURFACE UTILITIES PRIOR TO BEGINNING EXCAVATION ACTIVITIES.
12. PROVIDE SITE SECURITY FILL-TIME FROM THE BEGINNING OF FIELD ACTIVITIES THROUGH COMPLETION OF ALL SOIL REMOVAL AND DISPOSAL ACTIVITIES.
13. PREPARE PROJECT-SPECIFIC HEALTH AND SAFETY PLAN FOR SOIL EXCAVATION, STOCKPILING, LOADING, AND TRANSPORT ACTIVITIES. PLAN SHALL COVER CONTRACTOR'S CREWS AND ACTIVITIES.
14. CREATE ACCESS ROAD IN THE GENERAL LOCATIONS SHOWN.
15. DECONTAMINATION PAD SHALL BE CONSTRUCTED OF A 6-INCH THICKNESS OF CRUSHED STONE WITH NOMINAL SIZE OF 1 TO 2 INCHES IN DIAMETER.
16. EQUIPMENT THAT COMES IN CONTACT WITH IMPACTED SOILS SHALL BE DECONTAMINATED PRIOR TO LEAVING THE SITE.
17. DECONTAMINATION PAD SHALL BE EXCAVATED AND REMOVED AFTER ALL OTHER EXCAVATION AND HAULING ACTIVITIES ARE COMPLETE.
18. CLEARING AND GRUBBING IS NOT REQUIRED. THE SITE CONSISTS GENERALLY OF NATIVE GRASSES, AND REMNANT PAVING AND FOUNDATIONS THAT ARE TO BE PART OF THE REMOVED MATERIALS WHERE LOCATED IN DESIGNATED AREAS.
19. EXCAVATE, STOCKPILE, CHARACTERIZE, LOAD, AND TRANSPORT SOIL MATERIALS AS SHOWN ON THE SITE PLAN AND DEFINED IN TABLE 1.
20. OWNER TO SAMPLE EXCAVATION SIDEWALLS AND BOTTOM TO CONFIRM THAT THE EXTENT OF IMPACTED SOILS HAVE BEEN REMOVED. A MINIMUM OF ONE SAMPLE WILL BE COLLECTED FOR EACH SIDE WALL SEGMENT. ONE ADDITIONAL CONFIRMATION SAMPLE TO BE COLLECTED FOR EACH 50-FOOT INTERVAL PAST THE FIRST 50- FEET OF SIDEWALL. ONE ADDITIONAL SAMPLE SHALL BE COLLECTED AT EACH SAMPLE LOCATION FOR THE FOLLOWING DEPTH INTERVALS: 1 TO 5 FEET; AND 5 TO 10 FEET. TWO SAMPLES WILL BE COLLECTED FROM THE BOTTOM OF EACH EXCAVATION. ONE ADDITIONAL SAMPLE WILL BE COLLECTED FOR EVERY 4,000 SQ. FT. OF AREA GREATER THAN 4,000 SQ. FT.
21. BACKFILL EXCAVATIONS LESS THAN 3- FEET DEEP BY CUTTING DOWN SIDEWALLS AT A 5:1 SLOPE AND FILLING TOWARD THE CENTER OF THE EXCAVATION. BACKFILL EXCAVATIONS GREATER THAN 3- FEET DEEP WITH IMPORTED STRUCTURAL FILL.
22. PLACE BACKFILL IN 1-FOOT MAXIMUM LIFT THICKNESS AND COMPACT TO 95% MAXIMUM DRY DENSITY.
23. TWO COMPOSITE SAMPLES SHALL BE COLLECTED FROM EACH STOCKPILE FOR THE FIRST 500 CUBIC YARDS, ONE ADDITIONAL SAMPLE SHALL BE COLLECTED FOR EVERY 500 CUBIC YARDS BEYOND 500 CUBIC YARDS.
24. STOCKPILED MATERIALS CLASSIFIED AS RCRA HAZARDOUS OR CALIFORNIA (NON-RCRA) HAZARDOUS SHALL BE LOADED AND TRANSPORTED TO KETTELMAN LANDFILL FOR DISPOSAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
25. STOCKPILED MATERIALS CLASSIFIED AS NON-HAZARDOUS SHALL BE LOADED AND TRANSPORTED TO ALTAMONT LANDFILL FOR DISPOSAL IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.
26. THE FOLLOWING QUANTITIES ARE ESTIMATED FOR DISPOSAL:  
RCRA HAZARDOUS 4,300 TONS  
CALIFORNIA HAZARDOUS 1,500 TONS  
NON-HAZARDOUS
27. GRADING ACTIVITIES ARE EXPECTED TO BEGIN IN MAY 2006 AND CONTRACTOR SHALL WORK CONTINUOUSLY TO COMPLETE THE WORK WITHIN EIGHT WEEKS FROM RECEIPT OF NOTICE TO PROCEED. SCHEDULE EXTENSIONS WILL BE ALLOWED IF DELAYS ARE CAUSED BY LABORATORY TURNAROUND TIMES OR ADDITIONAL EXCAVATIONS ARE REQUIRED TO CAPTURE THE EXTENT OF CHEMICAL IMPACTS.
28. EROSION CONTROL SHALL BE PROVIDED FOR SLOPING EXCAVATED AREAS SUCH THAT SITE DRAINAGE IS DIRECTED TO THE CENTER OF THE EXCAVATED AREAS.
29. OBTAIN GRADING AND EROSION CONTROL PERMIT FROM THE CITY OF MODESTO.
30. OBTAIN AND PAY ALL FEES FOR ANY LOCAL PERMITS FOR THE EXCAVATION, LOADING, TRANSPORT, AND DISPOSAL OF IMPACTED MATERIALS.
31. PROVIDE ON SITE DUST CONTROL USING A WATER TRUCK TO SPRAY SUFFICIENT WATER TO CONTROL VISIBLE DUST EMISSIONS. EXCESS WATER SHALL NOT BE APPLIED. WATER SHALL BE OBTAINED FROM A FIRE HYDRANT ALONG GRAPHICS DRIVE. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIREMENTS AND FEES TO OBTAIN WATER.
32. VEGETATIVE RESTORATION OF THE EXCAVATED AREAS WILL BE REQUIRED IF SITE DEVELOPMENT IS NOT SCHEDULED TO BEGIN WITHIN 90 DAYS FROM COMPLETION OF THE SOIL REMOVAL ACTIVITIES. VEGETATIVE RESTORATION SHALL INCLUDE: HYDRO-SEEDING OR "RANCH DRILLING" THE DISTURBED AREAS WITH A SEED MOISTURE MATCHING THE NATIVE GRASSES, APPLYING A STRAW OR HAY MULCH AT 1,500 POUNDS PER ACRE TO A UNIFORM THICKNESS, AND ANCHORING WITH WOOD CELLULOSE FIBER MULCH SPRAY AT A RATE OF 600 TO 750 POUNDS PER ACRE. CONTRACTOR SHALL BE RESPONSIBLE FOR WATERING AND MAINTAINING SEEDED AREAS FOR 90 DAYS TO ASSURE THAT THE INITIAL PLANTINGS ARE SUCCESSFUL.

ZONE

REV.

DESCRIPTION

BY

DATE

APP.

REVISIONS

SCALE: 1" = 100'

CHECKED: JB

DRAFTED: MAH

DATE: 10/05

REGISTERED PROFESSIONAL ENGINEER  
NO. 43803  
EX-6-3-00  
CIVIL  
STATE OF CALIFORNIA

Geotrans, Inc.

MODESTO, STANISLAUS COUNTY, CALIFORNIA

EXISTING TOPOGRAPHY  
AND EXCAVATION PLAN

C-1

SHEET 1 OF 1

## **Appendix A**

### **General Site-Wide Health and Safety Plan**

**General Site Health and Safety Plan  
For Interim Action  
Remedial Action Workplan  
FMC Corporation  
Modesto, Stanislaus County, California**

March 2006

Prepared for:

FMC Corporation  
P.O. Box 58123  
Santa Clara, CA 95052

Prepared by:

GeoTrans, Inc.  
10860 Gold Center Drive, Suite 200  
Rancho Cordova, CA 95670

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Table 8	Soil Sampling Results, Barium - Total, WET, and TCLP Metals

## **FIGURES**

Figure 1	Site Location Map
Figure 2	Approximate Areas of Soils with Concentrations Above Health-Based SSTLs

## **APPENDICES**

Appendix A	Site Standard Safety Operating Procedures and Field Safety Briefing Attendance Sheet
Appendix B	Underground Service Alert Notification Instructions; Damaged Utility Procedures; and, Spill and Discharge Control Practices
Appendix C	Heat Stress Effects and Treatment; Cold Stress Effects and Treatment; Spider Bites; Snake Bites; Bee Stings
Appendix D	Emergency Numbers, Map, and Written Directions to Hospital

## **1.0 INTRODUCTION**

This general health and safety plan (HASP) is for the FMC Corporation (FMC) site, located in Modesto, California. This HASP has been prepared in accordance with the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response; Final Rule Standard 29 CFR 1910.120; and in accordance with Title 8 California Code of Regulations (CCR) 5192. The purpose of this plan is to provide an umbrella health and safety document for implementing the Interim Action, Remedial Action Workplan (Interim RAW) to excavate a portion of soils on the FMC Site. This general health and safety plan provides the site emergency procedures and identifies the general Site potential health and safety hazards pursuant to 8 CCR, Section 5192 (b)(1)(C). This general health and safety plan is not intended to cover action-specific tasks in the RAW (i.e., excavation); each contractor/subcontractor hired for completion of specific tasks will be responsible for compliance with all safety and health protection requirements for its employees, including preparation of a RAW action-specific health and safety plan.

The components of this HASP are identified in State of California regulations (8 CCR § 5192). This HASP is organized into 12 sections:

- Section 1 identifies the Site and the purpose of the general health and safety plan;
- Section 2 provides background site information including a Site description, an overview of Site impacts and Site investigations, and Site maps;
- Section 3 presents the project organization and responsibility of key personnel;
- Section 4 summarizes the scope of work as presented in the Interim RAW;
- Section 5 evaluates the general chemical and physical hazards based on Site constituents and the proposed scope of work;
- Section 6 summarizes the Site control measures including Site access, safe work practices, Site communication and work zone definition;
- Section 7 presents air monitoring requirements;
- Section 8 presents the general personal protective requirements based on monitoring results;
- Section 9 presents the general personnel and equipment decontamination requirements;
- Section 10 presents the general emergency response and contingency plan including planning personnel roles, emergency recognition and prevention, and evacuation routes and procedures, directions to the hospital and emergency notification;
- Section 11 presents general employee training requirements; and
- Section 12 presents general medical surveillance program requirements.

## 2.0 BACKGROUND INFORMATION

The FMC Site is located at 1200 Graphics Drive in Modesto, California. The Site is a 43-acre property located between Woodland Avenue, 9th Street, Kansas Avenue, and Graphics Drive in an industrial area of Modesto, California, adjacent to Highway 99, as shown on Figure 1. The FMC property was developed by a predecessor company as a manufacturing facility in the late 1920s to produce barium chemicals from barite ores. FMC acquired the property and facilities in 1948 as a result of the merger of Food Machinery Corporation and Westvaco Chlorine Products Company; the merged company continued to produce barium chemicals. In 1960, FMC began the production of strontium chemicals from celestite ores. The facility also produced various chemicals including sodium sulfide from by-products of the manufacturing processes. Other by-product materials produced at the plant included arsenical compounds that were formed from arsenic brought onto the Site as a raw material. Production of these chemicals generated the following materials: barium carbonates, barium sulfates, barium silicates, and strontium production waste.

The manufacturing operations discharged solid residues slurried with water to a series of diked, unlined evaporation ponds located in the western portion of the Site from the 1950s to the late 1970s. Waste residue slurries from processing barite and celestite ores were discharged to ponds to evaporate the liquid and store the residue prior to disposal. The ponds received a maximum of 200 to 300 gallons per minute of slurry between the 1950s to late 1970s.

Site production stopped in May 1984. By March 1985, the manufacturing facility was dismantled, inventory was eliminated, equipment was removed, underground storage tanks were cleaned out and removed, the production buildings were demolished, the evaporation pond area was closed in accordance with RWQCB oversight, and the Site was closed. Currently, the Site contains multiple vacant and unsecured buildings. The Site is completely enclosed by a cyclone fence.

Railroad tracks and 9<sup>th</sup> Street form the northeast boundary of the Site. Foster Farms facility is located east of the Site. The Foster Farms facility is a milk products manufacturing facility and consists of several production buildings and warehouses. A metal salvage yard and retail businesses are also located along the eastern Site boundary. Graphics Drive forms the southwestern and western Site boundaries. An MID electricity generation plant is located directly north of the Site.

Impacts at the Site have historically been elevated levels of Total Dissolved Solids (TDS), sulfate, and sulfide in groundwater. An extraction and treatment system designed to capture shallow zone Site groundwater flowing across the Site was installed in 1996. Extracted groundwater is treated with hydrogen peroxide to meet City of Modesto Discharge Requirements for the Water Treatment System. The treated extracted groundwater is discharged to the city sewer. Site soils have been identified to be impacted with barium, arsenic, sulfate, sulfide, strontium, other metals, polynuclear aromatic hydrocarbons (PAHs), and total petroleum hydrocarbons (TPH).

Investigation activities were first conducted at the Site in the 1960s. Since that time, FMC has conducted a number of investigations and instituted programs for regular monitoring of groundwater conditions. Previous investigations have included testing to determine on-site soil impacts and installation of groundwater monitoring wells located on- and off-site. A summary of investigations completed to date and analytical results and lithologic logs are presented in the *Comprehensive Remedial Investigation Report, FMC Corporation, 1200 Graphics Drive, Modesto, Stanislaus County, California*, dated January 2004 (Comprehensive RI Report) and the *Addendum to the Comprehensive Remedial Investigation Report FMC Corporation, 1200 Graphics Drive, Modesto Stanislaus County, California* (RI Addendum), January 2005.

A human health risk assessment (HRA) was conducted to determine whether present Site conditions pose a potential health hazard to future Site users, and if necessary, to calculate health-based site specific target levels (SSTLs) for constituents of interest (COIs) in soil, and in shallow and deep zone groundwater. Based on the planned use of the Site, the HRA evaluated potential exposure to chemicals detected in Site soils, using

scenarios for future indoor commercial workers, future outdoor service workers, and future construction workers. Additionally, a screening residential scenario was conducted, including the assumption of contact with soil and ingestion of groundwater, even though current Site use and Site plans do not include zoning use for residential purposes and redevelopment. Use of groundwater beneath the site is considered hypothetical, because drinking water is supplied by the City of Modesto. Excess cancer risks and hazard index values for non-carcinogens were calculated based on DTSC guidance using concentrations of chemicals detected in soil. The receptors evaluated included commercial workers, construction workers, service workers, and residents potentially exposed to constituents in soil via inhalation, incidental ingestion, and dermal contact with soil. The total excess cancer risk estimates for the commercial, construction, and service worker scenarios are  $4 \times 10^{-5}$ ,  $9 \times 10^{-6}$ , and  $7 \times 10^{-5}$ , respectively. The total hazard index values for the commercial, construction, and service worker scenarios are 0.2, 1.0, and 0.3, respectively. The USEPA considers  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$  to be the target range for acceptable risks at sites where remediation is considered (USEPA, 1990). Among the carcinogenic COIs, benzo(a)pyrene (BaP) equivalents and arsenic contributed more than 99% of the excess cancer risk. Barium and arsenic contributed to the majority of the noncancer hazards.

Health-based soil SSTLs were developed for chemicals that contribute the most to the overall cancer risk and hazard index. SSTLs were determined to be protective of potential health risks based on the planned use of the Site as a business park. Health-based SSTLs for soils were determined for arsenic and benzo(a)pyrene equivalents because those scenarios resulted in the risk estimates greater than  $1 \times 10^{-5}$ . Additionally, an SSTL was calculated for barium, because it contributed most significantly to the overall hazard index value for all pathways evaluated, although the value was still below the target level of 1.0. To calculate the SSTLs, the same exposure parameters as those in the baseline risk assessment were used, along with a target excess risk level of  $1 \times 10^{-5}$  and a hazard index of 1.0. The calculated soil SSTLs are summarized below.

Constituent of Concern	Soil Health-Based SSTL (mg/Kg)	Rationale
Benzo(a)pyrene equivalents	1.2	Outdoor Service Worker
Arsenic	27	Indoor Commercial Service Worker
Barium	58,400	Construction Worker

A feasibility study (FS) was conducted to develop and evaluate alternatives to remediate soil and groundwater impacts at the Site. The FS evaluated remedial alternatives and propose a final alternative to protect human health and the environment. The proposed final remedial alternative for soil consists of removing Site soils with constituent concentrations greater than the health-based SSTLs. Figure 2 identifies the approximate area of soils that exceed the health-based SSTLs and disposing these soils off-site. These soils will be excavated and disposed of at licensed landfills, in accordance with local, state, and federal regulations.

This Health and Safety Plan generally discusses health risks and safety hazards associated with implementing the RAW, that identifies excavating soils that exceed the SSTLs.

### **3.0 PROJECT ORGANIZATION AND RESPONSIBILITY**

This section identifies the key health and safety personnel, along with their responsibilities.

On-Site Safety Officer - The On-Site Safety Officer (OSSO) is responsible for ensuring all Site personnel are participants of a medical surveillance program, providing hazard communication information, providing training in safe operating procedures, and advising the project manager on any matters concerning the health and safety of employees or the public. The OSSO may be required to perform various types of area or personnel monitoring for purposes of verifying worker exposure and proper selection of Personal Protective Equipment (PPE). The OSSO will have the authority to change procedures and levels of protective clothing or to shut down operations.

Project Manager - The Project Manager (PM) has the primary responsibility for the fulfillment of the terms of the contract. The PM must oversee operations and ensure that all legal and health and safety requirements are met. It is the duty of the PM to keep the project on schedule, within budget, and to communicate with the client regarding the progress toward the specified goals.

Field Supervisor - The Field Supervisor will maintain Site security, oversee the field staff, and ensure compliance with all procedures (health and safety, decontamination, protective equipment, etc.). The Field Supervisor will act as a backup authority for changing levels of personal protection or shutting down operations in the absence of the OSSO.

Health & Safety Officer - The Health & Safety Officer will review the health and safety plan to see that all operations and equipment comply with OSHA Regulations 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" and applicable parts of OSHA 29 CFR 1910 and 1926. The health and safety protocols established in this plan are based on the Site conditions and health and safety hazards known and/or anticipated to be present from available Site data. This general HASP is intended solely for general use during the activities described in the Site Interim RAW. Specifications herein are subject to review and revision based on actual conditions encountered in the field during Site activities.

The personnel and organizations associated with the RAW activities will be identified by the RAW action-specific Health and Safety Plan prepared for and by the designated contractor/subcontractor. The organizational structure will be reviewed and updated by the responsible contractor/subcontractor as necessary during the course of the project.

#### **4.0 SCOPE OF WORK**

The soil RAW consists of excavating soils with concentrations above the SSTLs and disposing of these soils at Kettleman Landfill (Class I) when constituent concentrations are classified as non-RCRA hazardous or at Altamont Landfill (Class II) when constituent concentrations are classified as non-hazardous.

Implementation of the soil RAW will consist of the following tasks:

- Site preparation;
- excavation;
- confirmation sampling;
- material transportation; and
- Site restoration.

An Interim RAW action-specific HASP will be prepared by the identified contractor/subcontractor for completion of each task or the contracted portion of each task.

## 5.0 HAZARD EVALUATION

The intent of this section is to identify and describe the chemical and physical hazards generally associated with tasks in the RAW, evaluate the risk from these hazards and present appropriate control measures for reducing or eliminating the hazard.

### 5.1 Chemical Hazard Review

Over 200 soil borings and 450 soil samples collected and analyzed across the Site since 1990 have characterized Site soil constituents. Site soil samples have been analyzed for metals, general minerals, PCBs, TPH, PAHs and VOCs. The frequency of detections and range of detected concentrations for inorganic compounds in soil are presented in Table 1. Barium was historically considered the main constituent of concern in Site soils. The range of barium detections in Site soils is from 8.1 mg/Kg to 160,000 mg/Kg; the highest detection is from a sample collected one-foot below ground surface. More than 150 samples have been collected and analyzed for total arsenic, the range of arsenic detections is from below the reporting limit of 0.002 mg/Kg to 231 mg/Kg, the highest arsenic detections are from the vicinity of the arsenic unloading and arsenic storage areas. General mineral analysis results are presented in Table 2. Sulfide was detected in samples collected in 1990, 2003, and 2004. Forty of the 44 sample results from 1990 were below the reporting limit of 10 mg/Kg, the four detections ranged from 31 to 3,300 mg/Kg. The highest detection was in a sample collected 10 feet below surface in the former evaporation pond area. The sulfide results for the 2003 and 2004 samples range from <0.6 to 301 mg/Kg, the highest concentration was in a sample collected 15 feet below ground surface. Sulfide concentrations combined with the Site pH values in soil and groundwater indicate that the sulfide concentrations are unlikely to provide a source for evolution of hydrogen sulfide gas.

PCBs were analyzed in 21 soil samples, as presented in Table 3. Seven separate arochlors were analyzed by USEPA method 8082; each arochlor was below its respective reporting limit for each sample. TPH was analyzed in 19 soil samples as presented in Table 4; TPH was detected in 7 samples, at concentrations that ranged from 14 mg/Kg to 34,500 mg/Kg. Only one sample, B-25 at 0.5 feet, had a TPH concentration that was greater than 1,000 mg/Kg, the Environmental Screening Level for TPH (RWQCB, July 2003a). The TPH result for the B-25 sample at 5-feet was less than the reporting limit. As a class, the hazards associated with petroleum hydrocarbons are best represented by evaluating the VOCs including BTEX and PAHs. VOCs were analyzed for 8 soil samples from 4 borings, all the analytes were below their respective reporting limit for every sample.

PAHs were analyzed in 114 soil samples, as listed on Table 5. PAHs were below reporting limits in 47 samples. The PAH analytes are commonly equilibrated to benzo(a)pyrene, the most carcinogenic PAH, and this value is referred to as the BaP equivalency. The BaP equivalency values range from 0.004 to 79 mg/Kg. The eight highest BaP equivalency values (above 2 mg/Kg) range from 4.7 mg/Kg to 79 mg/Kg, are all located in surface soils (0.5 to 1.5 feet below surface) in the lamp black vicinity.

Groundwater samples are collected semiannually from on- and off-site shallow and deep zone groundwater monitoring wells. The most recent groundwater monitoring well analytical data from July 2005 are presented in the attached Tables 6 and 7. The depth to groundwater is about 45 to 50 feet below ground surface and expected maximum total depth of Site excavation is about 10 feet below ground surface. Therefore, contact with groundwater is not expected during implementation of the RAW.

A summary of the chemical, physical, and toxicological characteristics of the primary constituents identified in Site soils is included in Table 1.

Table 1

## Assessment of Major Chemical Hazards

Chemical Name (or class)	PEL/TLV	Other Pertinent Limits (Specify)	Warning Properties - Odor Threshold	Potential Exposure Pathways	Acute Health Effects	Chronic Health Effects
Metals - Arsenic	0.01/0.1 mg/m	NIOSH Ceiling= 0.002 mg/m <sup>3</sup>	Odorless solid	Inhalation; Dermal; Ingestion	Eye, skin and respiratory irritation	Confirmed human carcinogen; lung, skin and lymphatic cancer; GI and skin disorders; peripheral neuropathy
Metals - Barium, soluble compounds	0.5/0.5 mg/m <sup>3</sup> (as total dust)	OSHA PEL TWA 0.5 mg/m <sup>3</sup> (RESP) NIOSH REL TWA 0.5 mg/m <sup>3</sup> (resp)	White, odorless, tasteless solids	Inhalation; Dermal; Ingestion	Eye, skin, and respiratory irritation	Neuromuscular disturbances; pneumoconiosis; heart problems
Metals - Barium Sulfate, In-soluble compounds	15/10 mg/m <sup>3</sup> (as total dust)	OSHA PEL TWA 5 mg/m <sup>3</sup> (RESP) NIOSH REL TWA 5 mg/m <sup>3</sup> (resp)	White or yellowish, odorless, tasteless solids	Inhalation; Dermal; Ingestion	Eye, skin, and respiratory irritation	Neuromuscular disturbances; pneumoconiosis; heart problems
Petroleum hydrocarbons	None cited	None cited	None cited	Inhalation; Dermal; Ingestion	Possible skin and respiratory irritation; CNS depression	Possible respiratory irritation; dermatitis
Naphthalene	10/10 ppm	STEL = 15 ppm	Tar odor - 0.3 ppm	Inhalation; Dermal; Ingestion	Eye, skin irritation; headache, nausea, abdominal pain	Damage to liver, kidneys, CNS

PEL = OSHA Permissible Exposure Limit; represents the maximum allowable 8-hr. time weighted average (TWA) exposure concentration.

TLV = ACGIH Threshold Limit Value; represents the maximum recommended 8-hr. TWA exposure concentration.

STEL = OSHA Short-term Exposure Limit; represents the maximum allowable 15 minute TWA exposure concentration.

TLV-STEL = ACGIH Short-term Exposure Limit; represents the maximum recommended 15 minute TWA exposure concentration.

## **Ingestion, Inhalation and Dermal Risk**

Ingestion of impacted soil is not considered a significant route of exposure for this project when inhalation exposure and dermal exposure are controlled through the use of PPE.

Control of ingestion risk will generally be limited to proper use of PPE, proper application of personnel decontamination procedures, where applicable, and good personal hygiene. Smoking or use of tobacco products is not allowed in the work area. Eating and drinking will be limited to a restricted area.

Dermal exposure will be controlled through the use of PPE when contact with potentially hazardous materials is possible.

Inhalation exposure will be controlled through dust control measures during excavation and caused by vehicular traffic around the site.

### **5.2 Physical Hazard Review**

Heavy Equipment - The operation of the excavation equipment presents physical hazards during the excavation activities. Excavation machinery digging arms may cause "struck by" accidents. Rotating exposed parts may cause "struck-by" or "pinch point" type accidents. Excavation operations may generate sound levels in excess of 85 decibels (dBA). Site Safety Standard Operating Procedures will be followed, and are included in Appendix A.

Vehicular Traffic - Vehicular traffic may be encountered on-site during the excavation and transport of excavated materials and to potential number of vehicles entering and exiting the Site. Typical traffic control measures including the placement of flagging, signs, and traffic cones. If needed, off-site traffic control measures will meet the City of Modesto and Cal-Trans requirements.

Underground Utilities - Locations involving subsurface penetration shall be marked in white paint or with stakes and Underground Service Alert (USA) shall be notified at least two working days before beginning excavation activities. Consult Appendix B to confirm that the utility representatives have visited the site and marked their facilities near the identified location. Contact USA if any utilities have not been marked at the Site. The Underground Service Alert Notification Instructions are included in Appendix B. Excavation locations will be cleared by a private utility locator.

In general, a distance of 6 feet will be maintained between the excavator and high pressure gas lines, and approximately 2 feet from all other utilities. Excavation equipment (at its full extension) must maintain a minimum distance of 15 feet from overhead power lines. Discretion will be used in evaluating the safety of each excavation location. If a utility is damaged during work, the guidance document, *Damaged Utility Procedures*, included in Appendix B, will be consulted.

Heat Stress - Heat stress is a concern when workers are required to wear protective clothing and/or work in hot weather. The average temperature in Modesto from April through October ranges from 60 to 80 degrees Fahrenheit (F), with average high temperatures of 80 to 95 degrees F. Temperatures average between 45 and 55 degrees F from November through March, with average high temperatures of 50 through 65 degrees F. Appendix C includes guidance for the prevention, recognition, and treatment of heat stress. The OSSO will be responsible for observing personnel for performance-related effects of high temperatures, and for making the necessary adjustments in work/rest periods to maintain a safe body temperature. Liquids will be provided for Site workers to hydrate before work and to replace lost body fluids periodically through the work shift.

Cold Stress - Cold stress is a concern when workers are required to work in cold weather. Appendix C includes guidance for the prevention, recognition, and treatment of cold stress.

**Slip, Trip, and Fall Hazards** - Slip, Trip, and Fall Hazards are present at the Site. Although the Site is not operating and the majority of buildings and production machinery have been removed, many trip hazards are present due to remaining concrete foundations and material hidden in the on-site vegetation. The work area will be kept free of debris during operations. Tools and equipment will be returned to their proper placement when not in use. Good housekeeping guidelines will be followed to keep the Site work area neat.

**Biological Hazards** - In central California, biological hazards include the potential presence of black widows, rattlesnakes, and yellow jackets. On Site, these animals are primarily expected to be present in and around the abandoned buildings. The best precaution for dealing with these hazards is to avoid contact with these animals. Site Personnel will never put their hands where they can't see them. Guidelines for spider bites, snake bites, and bee stings are included in Appendix C.

**Other** - There will be no confined space entry work as part of this remedial action. Site personnel are not permitted to enter any of the abandoned buildings at the Site.

### 5.3 Job Hazard Analysis

The evaluation of the general hazards is based upon the understanding of the Site background information and anticipated risks posed by the various tasks. A summary of general hazards and protective measures for the RAW activities are presented below.

**Table 2**

**Major safety/health hazards/risks:**

Item	Potential Risk	Item	Potential Risk
Heat	X	Cold	
Heavy Lifting	X	Noise	X
Slippery/Wet Surfaces	X	Hot Surfaces	
Buried/Overhead Utilities	X	Poisonous Insects/Plants/Animals	
Power Tools	X	Motors/Belts/Pulleys	
Vehicles	X	Heavy/Large Equipment	X
Electrical Equipment		Elevated Surfaces	

**Major safety/health hazards/risks:**

1. Physical hazards associated with soil excavation equipment.
2. Physical hazards associated with vehicular traffic at site.
3. Ingestion and dermal risk associated with soil excavation and confirmation sampling.
4. Ingestion and dermal risk associated with dust generated by soil excavation and vehicular traffic around the Site.
5. Underground and overhead utilities.

## **6.0 SITE CONTROL**

This section reviews the general Site access, safe work practices, site communication and defines the work zones.

### **6.1 Site Access**

Non-contractor personnel will be instructed by the field supervisor to maintain a safe distance from the work activities.

### **6.2 Safe Work Practices**

Appendix A contains the Site Standard Safety Procedures. A Health and Safety Tailgate Meeting will be held daily prior to beginning operations each day. Appendix A also includes the Field Safety Briefing Attendance Sheet.

### **6.3 Site Communication**

Contractor/subcontractor will be responsible for preparing a job specific HASP and providing personnel with communication equipment and providing emergency contact numbers.

### **6.4 Work Zone Definition**

During each project activity, the surrounding area will be divided into two work zones: the Exclusion Zone and Support Zone. Each work zone is discussed below.

Exclusion Zone - The Exclusion Zone is the area where there is the most potential to cause harm to personnel in the performance of work activities. Entry into the Exclusion Zone is restricted to authorized personnel and requires the use of appropriate personal protective equipment.

Support Zone - The Support Zone includes areas where the chance to encounter hazardous conditions is minimal. All areas, exclusive of the Exclusion Zone, shall be considered clean areas and within the Support Zone.

Decontamination of equipment and personnel will be conducted within the Support Zone.

## 7.0 AIR MONITORING REQUIREMENTS

The constituents of concern at the Site are not volatile, therefore monitoring for VOCs is not required. However, climate in Modesto can be windy during different times of the year and excavation activities and vehicle traffic across unpaved portions of the site can create dust. Dust control measures will be implemented to preclude visible fugitive dust. Control measures include backblading of soil, wheel compaction, and water application. Dust monitoring will be conducted during the excavation activities.

Air monitoring instruments will be used to determine the concentration of total air borne particulates during any activity that disturbs surface soils. An action level for dust was calculated using the Marlowe Dust Exposure Calculation Worksheet (American Industrial Hygiene Association, [http://www.aiha.org/Committees/html/ei\\_sig/DUSTLEVL.XLS](http://www.aiha.org/Committees/html/ei_sig/DUSTLEVL.XLS)) and Site soil concentrations in the upper 10 feet using the 95 % Upper Confidence Level (UCL) of the concentration of chemicals detected by Total Threshold Limit Concentration (TTLC) analysis of Site soils during RI activities, including metals, general minerals, and polynuclear aromatic compounds. Barium particulates are the limiting constituent of concern in this action level calculation. The calculation determines the air concentration of total dust at which barium concentrations would be at the established exposure limit; the calculated total dust concentration is 5.0 mg/m<sup>3</sup> particulate matter greater than 10 micrometers (PM10). The Marlowe Dust Exposure Calculation Worksheet includes a very conservative safety factor of four. Additionally, the calculation assumes 100 percent of the barium exists as the soluble form rather than as the insoluble barium sulfate form. The calculation uses the Permissible Exposure Level (PEL) of 0.5 mg/m<sup>3</sup> established for soluble barium rather than the PEL of 10 mg/m<sup>3</sup> for insoluble barium sulfate. Table 8 presents the results of analyses for soluble barium using both California Waste Extraction Test (WET) and WET-DI extraction. The highest soluble barium concentration detected was 2,200 mg/L. Using a conversion factor of 10 to convert mg/L extract to mg/Kg, the concentration of soluble barium in soil would therefore be 22,000 mg/Kg, which is comparable to the Site wide 95% UCL detected by TTLC analysis of Site soils during RI activities. Direct reading dust level monitors will be used to monitor dust levels during excavation activities.

In addition, the Contractor will collect some dust samples for barium analysis following NIOSH guidelines by outfitting personal sampling pumps to collect dust samples, and following direction from FMC. The barium analysis from dust collected on individual Site personnel will be used to evaluate the potential barium concentration in Site dust generated during Site development grading and to evaluate the appropriateness of the calculated total dust action level. Based on the total barium airborne concentration, the action level of 5.0 mg/m<sup>3</sup> may be modified for future work activities.

### Monitoring Instruments:

Site personnel will wear personal sample pump dust monitors to provide real time dust level monitoring. The personal sampling pumps on selected workers will be fitted with a respirable dust sampler using a clean cyclone equipped with a preweighed filter. The filters will be analyzed to determine the concentration of barium in the dust. The monitoring results as a time weighted average will be evaluated by comparing to STEL and PEL values.

### Action Levels for Upgrades:

5.03 mg/m<sup>3</sup> PM10

### Level of Protection:

Engineering controls and dust analysis for barium

## 8.0 PERSONAL PROTECTIVE REQUIREMENTS

Standard operating procedures dictate that all Site personnel will wear protective equipment when project activities involve known or suspected atmospheric contamination, when gases/vapors, or particulates may be generated by Site activities, or when direct contact with dermal toxins or dermal-absorbing substances may occur. These situations are not anticipated to be encountered at the Site; therefore, Level D protection is deemed to be appropriate for the Site activities generally covered in this HASP.

The Level of Protection selected is based upon the following:

1. Type and measured concentration of the chemical substance in the ambient atmosphere, and the toxicity of the chemical substance.
2. Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done.
3. Knowledge of chemicals on Site and properties such as toxicity, route of exposure, and contaminant matrix.

### **Protective Equipment/Instruments (specify type, as necessary)**

Hard hat	<u>X</u>	Boots:	<u>X</u>	Glasses (type):	<u>X</u>
Suits:	<u>X</u>	Respirator:	<u>      </u>	First aid kit:	<u>X</u>
PID:	<u>      </u>	CGI:	<u>      </u>	Hearing Protectors:	<u>X</u>
Gloves:	<u>X</u>	Reflective Vest:	<u>X</u>	Dust Monitoring	<u>X</u>

**Safety Equipment Levels/Upgrades:** Level D: steel-toed boots, hearing protection, safety glasses, and hard hat.

### **Work Zone Requirements:**

Field personnel engaged in work operations are required to wear the following equipment:

- Hard hats;
- Safety glasses or goggles;
- Steel-toed boots;
- Hearing protection, at the discretion of the Site Safety Officer;
- Standard work uniform (long-sleeved shirt, long pants). Tyvek suit or cloth coveralls (when contact with potentially contaminated soils is anticipated);
- Steel-toed rubber or leather boots are required;
- Nitrile or other chemically resistant gloves (when contact with potentially contaminated soils or hazardous materials is anticipated).

### **Reassessment of Protection Program**

The Level of PPE shall be upgraded or downgraded based upon a change in Site conditions or findings of investigations. When a significant change in Site conditions occurs, the hazards will be reassessed. Some indicators for reassessment are:

1. Change in job tasks during a work phase.
2. Change of season/weather.
3. When temperature extremes limit the effectiveness of PPE.
4. Contaminants other than those previously identified are encountered.

The RAW action-specific HASP will include the procedures for upgrading or downgrading PPE, including identifying the decision making point of contact.

## **9.0 DECONTAMINATION PROCEDURES**

General decontamination procedures will remove contaminants that may accumulate on workers and equipment during Site activities and will prevent contaminants from migrating from the Site.

Decontamination involves the orderly and controlled removal of contaminants. Standard contamination control methods and decontamination sequences are presented in this section. All Site personnel should minimize contact with contaminants in order to limit the need for extensive decontamination.

Contamination control methods include using PPE when appropriate [disposable coveralls (Tyvek or equivalent), gloves (disposable liner, neoprene or nitrile outer), shoe or boot covers; equipment covers (plastic bags or sheets)]; and avoiding direct contact with the contaminated material and surfaces where possible.

### **9.1 Personnel Decontamination**

Preliminary personnel decontamination will be done in the Support Zone. The following is a list of the equipment that may be necessary for decontaminating personnel, and the procedures that should be followed.

#### Equipment:

1. Waste containers
2. Pressure washer and water tank
3. Brushes
4. Detergent
5. Plastic sheeting
6. Paper towels

#### Decontamination procedures:

##### Level D

1. Wash equipment and hands.

### **9.2 Equipment/Instruments**

Tools and small equipment will be decontaminated, as necessary, at the completion of each task or whenever they require additional cleaning. Prior to cleaning, equipment will be stored on plastic sheets in appropriate places on the trucks. Personnel will wear protective clothing during decontamination of equipment equivalent to the Level of Protection required during the use of the equipment.

All possible measures will be taken by personnel to prevent the contamination of any monitoring equipment. Instruments that cannot be easily decontaminated will be placed in a clear, sealable, plastic bag that allows for sample intake and exhaust.

### **9.3 Heavy Equipment**

#### Decontamination procedures

High pressure water will be used, as necessary, to clean wheels, undercarriage, and upper structures of equipment. The Field Supervisor will determine the level of decontamination necessary, and will approve the decontamination procedure.

The tools and small equipment will be pressure cleaned with water, as necessary. Instruments will be wet wiped if contaminated.

## **10.0 EMERGENCY RESPONSE/CONTINGENCY PLAN**

This section describes general contingency and emergency planning procedures for workers during the RAW activities. All project-related emergency incidents will be reported immediately to the Project Manager. The individual contractor firms are responsible for developing an emergency response contingency plan within their scope of work.

### **10.1 Pre-Emergency Planning**

All contractor employees will be briefed on the provisions of their Site Health and Safety Plan during the daily tailgate meetings. A record of this meeting will be recorded on the Field Safety Briefing Attendance Sheet included in Appendix A. This general Health and Safety Plan will be reviewed and revised, as necessary, to ensure that it is adequate and consistent with daily Site conditions.

### **10.2 Personnel Roles and Lines of Authority**

The Field Supervisor has primary responsibility for responding to and correcting emergency situations and for taking appropriate measures to ensure the safety of Site personnel. Possible actions may involve evacuation of personnel from the Site area, or the shut down of operations. The Field Supervisor is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The OSSO will direct responses to any medical emergency.

### **10.3 Emergency Recognition/Prevention**

Section 5 and Tables 1 and 2 identify the chemical and physical hazards of the project. Personnel will be familiar with techniques of hazard recognition from health and safety training and Site-specific briefings (tailgate meetings). The OSSO is responsible for ensuring that appropriate PPE is available to personnel.

### **10.4 Evacuation Routes and Procedures**

In the event of an emergency that necessitates an evacuation of the Site, personnel will be expected to mobilize to a safe distance from the emergency. Personnel will remain at that area until an authorized individual provides further instructions. The route of evacuation and designated assembly point will be discussed at the daily tailgate meeting. Appendix D includes a map and written directions highlighting the primary route to the nearest hospital from the Site.

### **10.5 Directions to Hospital**

The closest hospital to the Site is:

Doctor's Medical Center  
1441 Florida Avenue  
Modesto, California  
(209) 578-1211

Appendix D includes a map and directions highlighting the emergency route to the Doctor's Medical Center from the Site.

### **10.6 Emergency Contacts/Notification**

In the event of an on-site emergency, personnel will take direction from the Field Supervisor or OSSO. If a utility is damaged during work, Site personnel will consult the Damaged Utility Procedures, included in Appendix B. In the event of a fuel spill, Site personnel will follow the Spill and Discharge Control Practices included in Appendix B. Also, the Field Supervisor will notify the Project Manager, who will notify the appropriate local, state, and federal agencies.

## **10.7 Emergency Procedure**

Project-related emergency events and procedures are summarized below.

### **Emergency Medical Treatment Procedures**

Any person who becomes ill or injured in the Exclusion Zone must be decontaminated to the maximum extent possible. First aid will be administered while awaiting an ambulance or paramedics. All injuries, illnesses and near misses will be immediately reported to the Project Manager. The Project Manager will immediately report the injury, illness, or near-miss to the appropriate person designated in the job-specific HASP.

Any person transported to a medical clinic or hospital for treatment will take the list of compounds to which they may have been exposed at the Site (Table 1).

Any vehicle used to transport contaminated personnel will be cleaned as necessary.

Thermal stress due to excessive heat or cold may occur due to extremes of temperature, workloads, and personal protective equipment. Appendix C describes prevention, recognition, and treatment of heat stress and cold stress.

### **Weather Related Emergencies**

Excavation shall not be conducted during severe weather accompanied by high winds or lightning. In the event of severe weather, work will be stopped, equipment will be secured (i.e., the excavator arms will be lowered) and personnel will leave the Site.

### **Spill or Leaks**

Spill clean-up equipment and supplies will be provided by the contractor/subcontractor. This equipment typically includes a shovel, shop broom, sorbent pads, and kitty litter or other sorbent chips. In the event of a fuel spill or leak, Site personnel will perform the following tasks:

1. Inform the Field Supervisor immediately.
2. Locate the source of the spillage and stop the flow if it can be done safely.
3. Begin containment and recovery of the spilled materials, if this can be done safely.

Site personnel will follow the Spill and Discharge Control Practices included in Appendix B.

## **10.8 First Aid and Emergency Equipment**

The Field Supervisor is responsible for maintaining the following first aid and emergency equipment:

1. First aid kit.
2. Emergency eye wash kit.
3. Fire extinguisher.
4. Potable water.
5. Blanket.

### **Emergency Phone Numbers**

Emergency phone numbers will be provided in the RAW action-specific HASP.

## **11.0 EMPLOYEE EDUCATION AND TRAINING**

### **11.1 General Health and Safety**

Project personnel shall have completed formal health and safety training in accordance with 29 CFR Part 1910.120(e).

### **11.2 Site-Specific Training**

Project personnel will be provided with Site-specific training on the potential health and safety hazards and control measures to be implemented at the work Site. On-site personnel will be instructed on the contents of the RAW action-specific HASP, names of qualified first-aid providers and the OSSO, location of first-aid equipment, procedures to be used in contacting emergency response personnel, location of emergency equipment, evacuation procedures to follow in case of emergency, and principles of personal hygiene. This training will be provided during the tailgate meeting.

On-site personnel will be made aware of the chemicals that may be encountered during the implementation of the RAW. Information will include potential routes of exposure, protective clothing to be worn and precautionary measures to be taken. Personnel will be informed of the signs and symptoms of chemical exposure and heat stress.

Prior to working at the Site, a pre-work meeting will be held to discuss the content of this plan, specific Site requirements and responsibilities of Site members.

## **12.0 MEDICAL SURVEILLANCE PROGRAM**

On-site personnel involved with this project will participate in a medical surveillance program in accordance with 29 CFR Part 1910.120(f). Personnel found to have medical conditions which could directly or indirectly be aggravated by exposure to chemical substances within the work environment or physical demands of the job are informed by the consulting physician of their condition and any restrictions in their activities. Additionally, each employee is evaluated to determine if they are physically able to perform work while using respiratory protective equipment in compliance with 29 CFR Part 1910.134. Documentation of this surveillance shall be included in the RAW action-specific HASP.

**TABLE 1**  
**On-Site Soil Sample Data Frequency and Range**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

<b>Parameter</b>	<b>Frequency: Number of Detections/Number of Samples Analyzed<sup>1</sup></b>	<b>Range of Analytical Detections (mg/kg)</b>
Aluminum, total	51/51	2,320 - 15,900
Antimony, total	44/127	<0.05 - 14.4
Arsenic, total	177/194	<0.002 - 231
Barium, total	314/314	8.1 - 160,000
Beryllium, total	109/127	0.04 - <1.2
Cadmium, total	39/127	0.05 - <2
Calcium, total	82/82	937 - 61,000
Chromium, Hexavalent	0/111	<0.6 - <0.7
Cobalt, total	126/126	0.66 - 17
Copper, total	127/127	2.9 -161
Iron, total	92/92	5,150 - 40,000
Lead, total	111/127	0.58 - 156
Magnesium, total	91/91	1,000 - 11,000
Manganese, total	51/51	70.1 - 478
Mercury, total	36/124	<0.01 - 1.67
Molybdenum, total	111/127	0.08 - 20
Nickel, total	124/127	1.9 - 215
Potassium, total	83/83	130 - 6,200
Selenium, total	0/126	<1 - <20
Silver, total	71/126	<0.02 - 11.9
Sodium, total	82/82	48.8 - 7,200
Strontium, total	125/125	3.6 -15,300
Thallium, total	110/127	0.03 - <3
Vanadium, total	127/127	3.8 - 342
Zinc, total	127/127	9.4 - 293

**Notes:**

mg/Kg = milligrams per kilogram

<sup>1</sup> "Number of Samples Analyzed" listed in this table represent all soil samples collected on Site between 1980 and 2004

Data table compiled for use by toxicologist for Health Based Risk Assessment.

Table 2  
Soil Sampling Results - General Minerals  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

SAMPLING LOCATION	DEPTH (FEET)	SAMPLE DATE	ALKALINITY, TOTAL (AS CaCO3) (MG/KG)	ALKALINITY, TOTAL (AS CaCO3) (WET-DI) (MG/L)	CARBONATE (AS CO3) (WET-DI) (PERCENT)	ALKALINITY, BICARBONATE (AS CaCO3) (MG/KG)	ALKALINITY, HYDROXIDE (AS CaCO3) (MG/L)	CHLORIDE (AS CL) (MG/KG)	CHLORIDE (AS CL) (WET-DI) (MG/L)	CYANIDE (MG/KG)	FLUORIDE (MG/KG)	FLUORIDE (WET-DI) (MG/L)	FLUORIDE (WET) (MG/L)	NITRATE (AS N) (MG/KG)	NITRATE (AS N) (WET-DI) (MG/L)	NITRATE-NITRITE (AS N) (MG/KG)	NITRITE (AS N) (MG/KG)	pH (pH units)	PHOSPHATE (MG/KG)	SILICA (MG/KG)	SODIUM (MG/KG)	SODIUM (WET-DI) (MG/L)	SODIUM ABSORPTION RATIO (WET-DI)	SPECIFIC CONDUCTANCE (µS/CM)	SPECIFIC CONDUCTANCE (WET-DI) (µMHOS/CM)	SULFATE (AS SO4) (MG/KG)	SULFATE (AS SO4) (WET-DI) (MG/L)	SULFIDE (MG/KG)	SULFIDE (WET-DI) (MG/L)	SULFUR (WET-DI) (PERCENT)	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE) (WET-DI) (MG/L)
S-1	10	8/14/1990	910			100		260						3.16				9.6			3800			960		1100		3300			
S-1	20	8/14/1990	190			680		70						4.97				8.8			3000			820		3200		< 10			
S-1	30	8/14/1990	< 40			340		< 40						3.16				8.2			1800			410		600		< 10			
S-1	45	8/14/1990	530			< 40	680	86						3.61				9.4			4200			770		580		80			
S-2	5	8/15/1990	860			600		130						4.29				9.3			1900			550		570		< 10			
S-2	15	8/15/1990	860			< 40	27 J	300						3.61				9.4			2700			770		680		990			
S-2	25	8/15/1990	670			290		300						3.39				9.5			3000			910		3100		< 10			
S-2	55	8/15/1990	1100			< 40	180	210						< 5				9.6			3400			750		420		31			
S-3	15	8/15/1990	< 40			240		50						3.39				5.8			440			65.4		90		< 10			
S-3	35	8/15/1990	< 40			630		23						3.61				6.4			990			100		36		< 10			
S-3	40	8/15/1990	< 40			490		11						3.84				7.7			860			90.2		57		< 10			
S-3	50	8/15/1990	< 40			440		14						< 5				6.9			300			55.5		60		< 10			
S-4	10	8/15/1990	< 40			440		< 5						2.93				6.9			350			54.8		57		< 10			
S-4	20	8/15/1990	< 40			200		86						76.75				6.2			310			81.9		12		< 10			
S-4	30	8/15/1990	< 40			590		43						65.46				7.6			380			120		12		< 10			
S-4	40	8/15/1990	< 40			150		< 5						36.12				4.8			430			46.2		21		< 10			
S-5	5	8/15/1990	< 40			680		340						< 5				8.3			490			330		16		1200			
S-5	15	8/15/1990	< 40			440		170						< 5				6.8			560			160		39		< 10			
S-5	25	8/15/1990	< 40			190		< 40						< 5				5.8			350			210		760		< 10			
S-5	45	8/15/1990	< 40			190		< 40						3.39				5.7			370			44		80		< 10			
S-6	15	8/17/1990	140			440		43						1.53				8.5			1400			260		640		< 10			
S-6	25	8/17/1990	770			540		86						3.39				9.2			7200			820		350		< 10			
S-6	35	8/17/1990	< 40			490		43						< 5				7.5			2800			360		780		< 10			
S-6	50	8/17/1990	< 10			49		< 40						< 5				6.4			1400			110		310		< 10			
S-7	10	8/20/1990	< 40			195		43						10.38				6			640			54.1		53		< 10			
S-7	20	8/20/1990	< 40			98		43						4.97				4.5			480			110		400		< 10			
S-7	30	8/20/1990	< 40			440		11						< 20				6.9			870			450		1800		< 10			
S-7	45	8/20/1990	< 40			240		< 10						2.71				5			330			110		370		< 10			
S-8	5	8/21/1990	< 40			340		11						3.39				6.5			520			63.6		23		< 10			
S-8	15	8/21/1990	< 40			390		11						< 5				6.8			440			60.9		8		< 10			
S-8	35	8/21/1990	< 40			195		< 40						< 5				5.8			700			26.2		< 5		< 10			
S-8	45	8/21/1990	< 40			240		43						4.06				6			590			45.5		87		< 10			
S-9	10	8/21/1990	< 40			195		11 J						1.38				5.7			290			23.7		< 5		< 10			
S-9	20	8/21/1990	< 40			240		43						1.94				6			150			26.5		< 5		< 10			
S-9	30	8/21/1990	< 40			340		86						< 5				6.3			320			38.3		< 5		< 10			
S-9	45	8/21/1990	< 40			195		11 J						< 5				5.8			650			37.8		66		< 10			
S-10	10	8/22/1990	< 40			540		< 40						< 5				7.1			740			240		680		< 10			
S-10	20	8/22/1990	720			980		86						< 5				9.2			4300			860		2600		< 10			
S-10	30	8/22/1990	820			1000		86						< 20				9.1			3200			580		460		< 10			
S-10	40	8/22/1990	< 40			290		43						< 20				6.5			2100			650		1700		< 10			
S-11	5	8/22/1990	< 40			630		< 20						2.26				7.3			1400			320		890		< 10			
S-11	15	8/22/1990	< 40			1600		11 J						< 5				7.3			640			160		320		< 10			
S-11	20	8/22/1990	530			890		290						1.85				8.8			4000			890		950		< 10			
S-11	30	8/22/1990	< 40			1300		53						< 5				7.7			2900			460		370		< 10			
DGM-2A <sup>1</sup>	0	5/5/1995			6.5			< 30				0.4 J	0.8					8.7		160		10.4	23.6			60				2.61	200

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DGM-3B	1																	0													
SS-2	0																	8.5													
SUS-5	1																	8.4													
A5	1																	8.6													
B5	1																	8.8													
C2	1																	9.6													
D8	1																	7.8													
E2	1																	9.3													
F4	1																	9.8													
J7	1																	6													
BGS-1	1	6/20/2002		28					0.5						< 0.2			8.74			73.1	< 1			59		5.6				284
BGS-1	5	6/20/2002		7					0.4						< 0.2			8.32			93.7	6.2			24		4.6				342
BGS-1	20	6/20/2002		15					8						2			8.98			738	27.9			124		24				492
BGS-1	25	6/20/2002		38					4.8						0.9			9.05			567	43.1			251		75				196
BGS-2	1	6/20/2002		11					0.4						< 0.2			8.53			64.4	5.1			45		6.6				300
BGS-2	5	6/20/2002		8					0.4						< 0.2			8.46			52.5	6.2			28		6.7				292
BGS-2	20	6/20/2002		21					0.9						0.4			9.31			685	20.7			82		20				584
BGS-2	25	6/20/2002		33					2.7						0.5			8.84			995	49.3			216		75				4940
BGS-3	1	6/20/2002		5					0.4						< 0.2			7.62			51.5	7			22		5.7				280
BGS-3	5	6/20/2002		6					0.2						< 0.2			7.78			48.8	5.4			16		3.5				416
BGS-3	20	6/20/2002		6					1.4						1.3			8.07			151	10.8			88		29				516
BGS-3	25	6/20/2002		46					2.3						0.7			9.13			223	9			86		5.3				482
BGS-4	1	6/20/2002		14					0.4						< 0.2			8.37			103	5.6			39		5.9				442
BGS-4	5	6/20/2002		15					1.2						0.9			8.89			253	12.1			51		8.4				491
BGS-4	20	6/20/2002		7					5.2						2.6			8.52			208	15.5			83		14.1				84
BGS-4	28	6/20/2002		13					2.1						0.4			8.74			203	8.4			38		5.6				1510
B-1	1	6/12/2003												1.5												133					
B-1	5	6/12/2003												< 1.2												3.4					
B-1	10	6/12/2003												< 1.2												3.8					
B-2	0.5	6/9/2003												< 1.3												27					
B-2	5	6/9/2003												< 1.3												37					
B-2	10	6/9/2003												< 1.3												7.8					
B-3	2	6/9/2003												< 1.3												229					
B-3	5	6/9/2003												< 1.3												19					
B-3	10	6/9/2003												< 1.3												20					
B-4	0.5	6/12/2003												30.8												568					
B-4	5	6/12/2003												< 1.2												339					
B-5	0.5	6/17/2003												37.9				10.02								593					
B-5	5	6/17/2003												2.5				9.82								20					
B-5	10	6/17/2003												4.8				8.78								2770					
B-6	0.5	6/13/2003												<1.3												283					
B-6	5	6/13/2003												1.5												164					
B-6	10	6/13/2003												6.2												87					
B-7	1	6/17/2003												1.8				8.28								208					
B-7	5	6/17/2003												< 1.3				7.58								683					

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FMC Corporation  
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SAMPLING LOCATION	DEPTH (FEET)	SAMPLE DATE	ALKALINITY, TOTAL (AS CaCO3) (MG/KG)	ALKALINITY, TOTAL (AS CaCO3) (WET-DI) (MG/L)	CARBONATE (AS CO3) (WET-DI) (PERCENT)	ALKALINITY, BICARBONATE (AS CaCO3) (MG/KG)	ALKALINITY, HYDROXIDE (AS CaCO3) (MG/L)	CHLORIDE (AS CL) (MG/KG)	CHLORIDE (AS CL) (WET-DI) (MG/L)	CYANIDE (MG/KG)	FLUORIDE (MG/KG)	FLUORIDE (WET-DI) (MG/L)	FLUORIDE (WET) (MG/L)	NITRATE (AS N) (MG/KG)	NITRATE (AS N) (WET-DI) (MG/L)	NITRATE-NITRITE (AS N) (MG/KG)	NITRITE (AS N) (MG/KG)	pH (pH units)	PHOSPHATE (MG/KG)	SILICA (MG/KG)	SODIUM (MG/KG)	SODIUM (WET-DI) (MG/L)	SODIUM ABSORPTION RATIO (WET-DI)	SPECIFIC CONDUCTANCE (µS/CM)	SPECIFIC CONDUCTANCE (WET-DI) (µMHOS/CM)	SULFATE (AS SO4) (MG/KG)	SULFATE (AS SO4) (WET-DI) (MG/L)	SULFIDE (MG/KG)	SULFIDE (WET-DI) (MG/L)	SULFUR (WET-DI) (PERCENT)	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE) (WET-DI) (MG/L)
B-7	10	6/17/2003												< 1.3				10.93								15					
B-8	0.5	6/10/2003												1.3												14					
B-8	5	6/10/2003												16.6												< 2.5					
B-8	10	6/10/2003												< 1.3												36					
B-9	0.5	6/10/2003												27.8												6.4					
B-9	4.5	6/10/2003														2										4.0					
B-9	9	6/10/2003														< 1.2									< 2.4						
B-10	1	6/17/2003	185	48				< 2.4	1.2					< 1.3	0.2			9.43			130				99	13.8	7.6	1.3	< 0.05		220
B-10	5	6/17/2003	800	79				< 2.4	< 0.2					1.9	< 0.2			9.52			701				125	4.7	2.3	0.8	< 0.05		187
B-10	10	6/17/2003	443	59				< 2.4	< 0.2					1.5	< 0.2			9.74			778				118	5.8	1.9	2.1	< 0.05		251
B-11	0.5	6/18/2003												3.3												155					
B-11	5	6/18/2003												< 1.2												6.4					
B-11	10	6/18/2003												1.7												8.8					
B-12	0.5	6/18/2003												9.8												13					
B-12	5	6/18/2003												< 1.2												< 2.4					
B-12	10	6/18/2003												< 1.2												2.3 J					
B-13	1	6/13/2003												<1.3												29					
B-13	5	6/13/2003												<1.3												2.7					
B-13	10	6/13/2003												<1.3												3.3					
B-14	0.5	6/16/2003												< 1.3							188					11.1					
B-14	5	6/16/2003												< 1.3							161					< 2.6					
B-15	0.5	6/16/2003												< 1.3							163					54					
B-15	5	6/16/2003												< 1.3							456					41					
B-15	10	6/16/2003												1.5							490					25					
B-16	0.5	6/10/2003	536	58				4.1	0.4						< 0.2	< 1.2		9.24			612				129	122	14	0.7	< 0.05		316
B-16	4.5	6/10/2003	802	110				< 2.4	< 0.2						< 0.2	< 1.2		10.05			996				271	284	36	1.4	< 0.05		588
B-16	9	6/10/2003	803	163				< 2.4	< 0.2						< 0.2	< 1.2		10.2			2160				403	393	37	2.6	< 0.05		724
B-16	15	6/10/2003	577	149				< 2.4	< 0.2						< 0.2	< 1.2		11.03			2010				592	714	117	2.5	< 0.05		832
B-17	0	6/10/2003														< 1.2										13					
B-17	4.5	6/10/2003														< 1.2										8.9					
B-17	10	6/10/2003														< 1.2										28.4					
B-17	14.5	10-Jun-03														2.1										118					
B-18	0.5	09-Jun-03												< 1.3													16				
B-18	5	09-Jun-03												< 1.3													6.9				
B-18	10	09-Jun-03												< 1.3													48				
B-18	15	09-Jun-03												< 1.3													549				
B-19	0.5	16-Jun-03												19.2							196						28				
B-19	5	16-Jun-03												11.5							1700						118				
B-19	10	16-Jun-03												13.9							1830						427				
B-20	0.5	6/16/2003	1120	141				4.7	0.5					8.4	0.5			10.04			1420				413	813	79	0.8	< 0.05		1370
B-20	5	6/16/2003	1260	124				< 2.6	< 0.2					2.0	< 0.2			9.93			1440				317	519	51	1.1	< 0.05		886
B-20	10	6/16/2003	1040	148				5.5	0.2					6.7	0.7			10.04			1660				386	580	59	1.6	< 0.05		940
B-20	15	6/16/2003	1820	327				8.3	0.7					< 1.3	< 0.2			11.77			2080				1830	532	54	301	< 0.05		988
B-21	0	6/11/2003	325	53				3	< 0.2					1.7	< 0.2			9.36			467				92	18.6	2.7	5	< 0.5		450
B-21	4.5	6/11/2003	219	39				< 2.4	< 0.2					< 1.2	< 0.2			9.35			435				101	102	17.4	2.3	< 0.5		186

Table 2  
Soil Sampling Results - General Minerals  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

SAMPLING LOCATION	DEPTH (FEET)	SAMPLE DATE	ALKALINITY, TOTAL (AS CaCO3) (MG/KG)	ALKALINITY, TOTAL (AS CaCO3) (WET-DI) (MG/L)	CARBONATE (AS CO3) (WET-DI) (PERCENT)	ALKALINITY, BICARBONATE (AS CaCO3) (MG/KG)	ALKALINITY, HYDROXIDE (AS CaCO3) (MG/L)	CHLORIDE (AS CL) (MG/KG)	CHLORIDE (AS CL) (WET-DI) (MG/L)	CYANIDE (MG/KG)	FLUORIDE (MG/KG)	FLUORIDE (WET-DI) (MG/L)	FLUORIDE (WET) (MG/L)	NITRATE (AS N) (MG/KG)	NITRATE (AS N) (WET-DI) (MG/L)	NITRATE-NITRITE (AS N) (MG/KG)	NITRITE (AS N) (MG/KG)	pH (pH units)	PHOSPHATE (MG/KG)	SILICA (MG/KG)	SODIUM (MG/KG)	SODIUM (WET-DI) (MG/L)	SODIUM ABSORPTION RATIO (WET-DI)	SPECIFIC CONDUCTANCE (µS/CM)	SPECIFIC CONDUCTANCE (WET-DI) (µMHOS/CM)	SULFATE (AS SO4) (MG/KG)	SULFATE (AS SO4) (WET-DI) (MG/L)	SULFIDE (MG/KG)	SULFIDE (WET-DI) (MG/L)	SULFUR (WET-DI) (PERCENT)	TOTAL DISSOLVED SOLIDS (RESIDUE, FILTERABLE) (WET-DI) (MG/L)
B-21	10	6/11/2003	36	10				< 2.4	< 0.2					< 1.2	< 0.2			8.5			206				59	153	27	1.1	< 0.5		153
B-21	14.5	6/11/2003	251	26				< 2.4	< 0.2					< 1.2	< 0.2			9.06			696				174	249	32	19	< 0.5		143
B-24	0.5	6/16/2003																			843										
B-24	5	6/16/2003																			172										
B-24	10	6/16/2003																			532										
B-27	0.5	6/18/2003												< 1.2												96					
B-27	5	6/18/2003												1.5												302					
B-28	1	6/18/2003												1.6												127					
B-28	5	6/18/2003												1.5												5.9					
B-29	1	6/12/2003												< 1.2												54					
B-29	5	6/12/2003												< 1.2												2.1 J					
B-29	10	6/12/2003												< 1.2												< 2.4					
B-31	1	6/12/2003												< 1.2												37					
B-31	5	6/12/2003												1.4												23					
B-31	10	6/12/2003												1.4												183					
B-32	0.5	6/13/2003												2.1				10.26								301					
B-32	5	6/13/2003												<1.3				9.36								9.3					
B-32	10	6/13/2003												5.3				9.56								491					
B-33	0.5	6/11/2003												< 1.2				10.77								22.6					
B-33	4.5	6/11/2003												15.3				9.69								12.0					
B-33	9	6/11/2003												< 1.2				9.42								19.5					
B-35	1	6/17/2003												2.1												82					
B-35	5	6/17/2003												2.7												6					
B-35	10	6/17/2003												< 1.3												3.2					
B-36	1	6/17/2003												< 1.2												34					
B-36	5	6/17/2003												< 1.2												2.2 J					
B-36	10	6/17/2003												< 1.2												3.5					
B-70	1-1.5	10/25/2004																7.97													
B-71	0.5-1	10/25/2004																9.85													
B-72	0.5-1	10/25/2004																7.58													
B-73A	0.5-1	10/25/2004																8.74													
B-73B	0.5-1	10/25/2004																8.6													
B-74	0.5-1	10/25/2004																7.8													
B-75	0.5-1	10/25/2004																9.33													
B-76	1.0-1.5	10/25/2004																9.41										1.1			
B-77	1.0-1.5	10/25/2004																9.03										<0.6			

Notes:  
MG/KG = milligrams per Kilograms  
MG/L = Milligrams per Liter  
µS/cm = microsiemens per centimeter  
µmhos/cm = micromhos per centimeter  
WET = Waste Extraction Test  
WET-DI = Waste Extraction Test, Deionized Water  
J = The result is an estimated concentration that is less than the method reporting limit but greater than or equal to the method detection limit.  
<sup>1</sup> Analytical results presented for DGM-2A are for the composited sample collected from sample locations DGM-2A, DGM-3A, and E-7.

**Table 3**  
**Soil Sampling Results - Polychlorinated Biphenyls, 2003**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Sample ID	Depth (feet)	PCB-1016 (AROCHLOR 1016)	PCB-1221 (AROCHLOR 1221)	PCB-1232 (AROCHLOR 1232)	PCB-1242 (AROCHLOR 1242)	PCB-1248 (AROCHLOR 1248)	PCB-1254 (AROCHLOR 1254)	PCB-1260 (AROCHLOR 1260)
		mg/Kg						
B-2	10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-6	0.5	<0.11	<0.21	<0.11	<0.11	<0.11	<0.11	<0.11
B-6	5	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-6	10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-6	25	<0.11	<0.21	<0.11	<0.11	<0.11	<0.11	<0.11
B-8	0.5	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-8	5	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-8	10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-8	25	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-25	0.5	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-25	5	< 0.099	< 0.2	< 0.099	< 0.099	< 0.099	< 0.099	< 0.099
B-25	10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-25	25	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-26	0.5	<0.11	<0.21	<0.11	<0.11	<0.11	<0.11	<0.11
B-26	5	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-26	10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-26	25	<0.11	<0.21	<0.11	<0.11	<0.11	<0.11	<0.11
B-29	1	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-29	5	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-29	10	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10
B-29	15	<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10

Notes:  
mg/Kg = milligrams per Kilogram

**Table 4**  
**Soil Sampling Results - Total Petroleum Hydrocarbons, 2003**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Sample Location	Depth (feet)	TPH as Diesel	TPH as Gasoline	TPH as Heavy Residual Range
		mg/Kg		
B-7	1	24	< 5.6	240
B-7	5	< 12	< 6.0	< 30
B-7	10	30	< 5.1	280
B-25	0.5	32,000	< 5.5	2,500
B-25	5	< 11	< 5.4	< 27
B-25	10	14	< 5.7	< 29
B-26	0.5	< 11	< 5.2	45
B-26	5	< 11	< 5.4	< 27
B-26	10	< 13	< 6.2	< 31
B-29	1	< 11	< 5.2	< 26
B-29	5	< 11	< 5.3	< 27
B-29	10	< 11	< 5.1	< 26
B-29	15	< 13	< 6.1	< 31
B-40	0.5	220	<11	580
B-40	5	<11	<11	<27
B-41	0.5	<11	<11	<26
B-41	5	<12	<12	<30
B-42	0.5	130	<10	580
B-42	5	<11	<11	<27

Notes:

mg/Kg = milligrams per kilogram

TPH = Total Petroleum Hydrocarbons

Table 5  
Soil Sampling Results - Polynuclear Aromatic Hydrocarbons, 2003  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

Sample Location	Sample Depth (feet)	Total PAHs	Total cPAHs	B(a)P Equivalence	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a)ANTHRACENE	BENZO(a)PYRENE	BENZO(b)FLUORANTHENE	BENZO(g,h,i)PERYLENE	BENZO(k)FLUORANTHENE	CHRYSENE	DIBENZ(a,h)ANTHRACENE	FLUORANTHENE	FLUORENE	INDENO(1,2,3-c,d)PYRENE	NAPHTHALENE	PHENANTHRENE	PYRENE
		mg/Kg																		
B-2	0.5	0.056	0.0271	0.0086	< 0.005	< 0.005	< 0.005	< 0.005	0.0058	0.0062	0.012	< 0.005	0.0064	< 0.005	0.0072	< 0.005	0.0087	< 0.005	< 0.005	0.01
B-2	5	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-2	10	0.056	0.011	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	< 0.005	0.011	< 0.005	0.0059	< 0.005	< 0.005	< 0.005	< 0.005	0.026
B-2	24	ND	ND	0.0044	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 0.0052
B-3	2	9.805	5.31	1.17	0.015	0.037	0.13	0.66	0.84	0.63	1.6 D	0.24	1.8 D	0.26	0.58	0.023	0.88	0.2	0.96	0.95
B-3	5	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-3	10	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-6	0.5	0.678	0.394	0.102	< 0.005	0.0052	0.0063	0.041	0.072	0.058	0.12	0.043	0.076	0.024	0.053	<0.005	0.08	0.0054	0.024	0.07
B-6	5	0.480	0.272	0.069	<0.005	<0.005	<0.005	0.029	0.05	0.041	0.076	0.026	0.056	0.019	0.045	<0.005	0.051	<0.005	0.027	0.06
B-6	10	ND	ND	0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-7	1	0.897	0.453	0.108	< 0.0051	0.0067	0.0068	0.039	0.076	0.071	0.15	0.051	0.098	0.018	0.09	< 0.0051	0.1	0.012	0.048	0.13
B-7	5	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-7	10	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-8	0.5	1.044	0.571	0.131	< 0.0046	0.0052	0.009	0.058	0.087	0.091	0.16	0.065	0.12	0.03	0.12	< 0.0046	0.12	0.006	0.053	0.12
B-8	5	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-8	10	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-9	0.5	3.013	1.88	0.479	< 0.005	0.021	0.023	0.18	0.33	0.29	0.52	0.17	0.4	0.14	0.18	< 0.005	0.37	0.029	0.11	0.25
B-9	4.5	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-9	9	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-10	1	0.547	0.300	0.068	< 0.005	< 0.005	0.0052	0.03	0.044	0.048	0.081	0.043	0.059	0.017	0.066	< 0.005	0.059	< 0.005	0.029	0.066
B-10	5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-11	0.5	1.284	0.794	0.208	< 0.0051	0.0073	0.0092	0.075	0.15	0.1	0.22	0.066	0.17	0.043	0.067	<0.0051	0.19	0.012	0.074	0.1
B-11A	5.0	0.022	0.0136	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0084	<0.005	0.0071	<0.005	<0.005	<0.005	0.0065	<0.005	<0.005	<0.005
B-12	0.5	0.080	0.0443	0.0114	<0.005	<0.005	<0.005	0.0054	0.008	0.0069	0.015	<0.005	0.013	<0.005	0.0058	<0.005	0.011	<0.005	0.0057	0.0093
B-13	1	1.657	1.033	0.272	<0.0051	0.0094	0.014	0.14	0.2	0.13	0.23	0.11	0.25	0.053	0.12	<0.0051	0.15	0.017	0.054	0.18
B-13A	5.0	0.194	0.134	0.037	<0.005	<0.005	<0.005	0.019	0.028	0.014	0.027	0.011	0.039	0.011	0.0097	<0.005	0.012	<0.005	0.007	0.016
B-14	0.5	0.184	0.1086	0.0282	<0.0051	<0.0051	<0.0051	0.0096	0.02	0.014	0.031	0.012	0.015	<0.0051	0.017	<0.0051	0.038	<0.0051	<0.0051	0.027
B-15	0.5	242	128	36.398	<0.050	1.4	0.9	14	28	16	31	17	20	1.7	30	0.095	31	0.42	3.5	47
B-16	0.5	2.154	1.12	0.288	< 0.0051	0.019	0.019	0.13	0.21	0.16	0.29	0.15	0.2	0.03	0.27	< 0.0051	0.24	0.015	0.081	0.34
B-16	4.5	1.797	0.913	0.243	< 0.005	0.019	0.017	0.1	0.18	0.13	0.25	0.12	0.16	0.023	0.22	< 0.005	0.2	0.015	0.073	0.29
B-16	9	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-16	15	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-17	0.5	0.018	0.0055	0.0047	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0076	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0055	< 0.005	< 0.005	0.0052
B-17	4.5	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-17	10	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-17	14.5	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051

Table 5  
Soil Sampling Results - Polynuclear Aromatic Hydrocarbons, 2003  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

Sample Location	Sample Depth (feet)	Total PAHs	Total cPAHs	B(a)P Equivalence	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a)ANTHRACENE	BENZO(a)PYRENE	BENZO(b)FLUORANTHENE	BENZO(g,h,i)PERYLENE	BENZO(k)FLUORANTHENE	CHRYSENE	DIBENZ(a,h)ANTHRACENE	FLUORANTHENE	FLUORENE	INDENO(1,2,3-c,d)PYRENE	NAPHTHALENE	PHENANTHRENE	PYRENE
		mg/Kg																		
B-18	0.5	0.111	0.0608	0.0071	<0.005	<0.005	<0.005	0.0061	0.0097	0.012	0.019	0.007	0.012	<0.005	0.011	<0.005	0.014	<0.005	0.0055	0.015
B-18	5	ND	ND	0.0044	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
B-18	10	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-18	15	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-19	0.5	0.580	0.3039	0.0773	<0.005	<0.005	<0.005	0.035	0.057	0.042	0.068	0.046	0.059	0.0059	0.074	<0.005	0.059	<0.005	0.024	0.11
B-19	5	0.048	0.0201	0.0081	<0.005	<0.005	<0.005	<0.005	0.0059	<0.005	0.013	<0.005	0.0078	<0.005	0.0058	<0.005	0.0064	<0.005	<0.005	0.0092
B-20	0.5	3.666	1.841	0.490	<0.0052	0.019	0.028	0.25	0.37	0.25	0.35	0.25	0.35	0.031	0.5	<5.2	0.34	0.018	0.15	0.76
B-20	5	0.085	0.0467	0.013	<0.005	<0.005	<0.005	0.0067	0.0089	0.0064	0.0085	0.0062	0.0095	<0.005	0.014	<0.005	0.009	<0.005	<0.005	0.016
B-22	0.5	0.808	0.448	0.0976	<0.005	<0.005	0.0054	0.051	0.066	0.074	0.1	0.062	0.11	0.018	0.11	<0.005	0.067	0.0059	0.042	0.097
B-22	4.5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-22	9	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-23	0.5	1.193	0.805	0.201	<0.0051	<0.0051	0.0099	0.11	0.15	0.11	0.16	0.063	0.2	0.062	0.075	<0.0051	0.11	0.0086	0.037	0.097
B-23A	5.0	0.007	0.0065	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0065	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-24	0.5	558	275.7	79	0.051D	4.5D	4D	38D	61	41D	39D	38D	48D	6.7D	83D	0.39D	43D	6.1D	15D	130D
B-24	5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-24	10	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-25	0.5	0.542	0.260	0.0408	<0.005	0.0051	0.027	0.017	0.02	0.068	0.11	0.021	0.066	0.014	0.056	<0.005	0.054	0.014	0.041	0.029
B-25	4.5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-25	9	ND	ND	0.0044	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
B-26	0.5	1.147	0.609	0.130	<0.0051	0.0074	0.019	0.058	0.093	0.093	0.22	0.075	0.12	0.02	0.089	<0.0051	0.15	0.033	0.07	0.1
B-26	5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-26	10	ND	ND	0.0044	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
B-26	25	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-27	0.5	0.023	0.013	0.0048	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.01	<0.0051	0.0058	<0.0051	<0.0051	<0.0051	0.0072	<0.0051	<0.0051	<0.0051
B-28	1	0.305	0.178	0.0403	<0.005	<0.005	0.0079	0.018	0.028	0.027	0.039	0.022	0.043	0.0067	0.025	<0.005	0.033	0.0069	0.017	0.031
B-29	1	0.081	0.0452	0.0123	<0.0051	<0.0051	<0.0051	<0.0051	0.0085	0.0086	0.018	0.0061	0.01	<0.0051	0.0075	<0.0051	0.012	<0.0051	<0.0051	0.01
B-29	5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-29	10	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-29	15	ND	ND	0.0044	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
B-30	0.5	10.75	5.78	1.537	0.0092	0.1	0.12	0.56	1.1 D	0.87	2.1 D	0.58	0.99	0.28	0.89	0.016	1.4 D	0.096	0.44	1.2 D
B-30	4.5	ND	ND	0.0044	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051
B-30	9	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-31	1	0.055	ND	0.0044	0.0062	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	0.0087	0.0096	<0.0051	<0.0051	0.023	0.0079
B-31	5	ND	ND	0.0044	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051	<0.0051

Table 5  
Soil Sampling Results - Polynuclear Aromatic Hydrocarbons, 2003  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

Sample Location	Sample Depth (feet)	Total PAHs	Total cPAHs	B(a)P Equivalence	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a)ANTHRACENE	BENZO(a)PYRENE	BENZO(b)FLUORANTHENE	BENZO(g,h,i)PERYLENE	BENZO(k)FLUORANTHENE	CHRYSENE	DIBENZ(a,h)ANTHRACENE	FLUORANTHENE	FLUORENE	INDENO(1,2,3-c,d)PYRENE	NAPHTHALENE	PHENANTHRENE	PYRENE
		mg/Kg																		
B-32	0.5	4.028	2.45	0.670	<0.005	0.03 D	0.046 D	0.29 D	0.48 D	0.33 D	0.6 D	0.23 D	0.53 D	0.19 D	0.32 D	<0.005	0.4 D	0.042 D	0.15 D	0.39 D
B-32	5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-33	0.5	ND	ND	0.0044	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
B-34	0.5	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-34	5	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-34	10	ND	ND	0.0044	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051	< 0.0051
B-43	0.5	0.556	0.221	0.0569	<0.005	0.0052	0.0052	0.021	0.04	0.026	0.18	0.02	0.039	0.011	0.033	<0.005	0.064	0.0066	0.03	0.075
B-43	5	ND	ND	0.0044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-44	0.5	0.606	0.3089	0.080	<0.005	0.0065	0.0054	0.034	0.059	0.04	0.092	0.039	0.055	0.0079	0.06	<0.005	0.074	0.0052	0.018	0.11
B-44	5	ND	0.113	0.031	<0.0043	<0.0043	<0.0043	0.015	0.023	0.015	0.027	0.016	0.021	<0.0043	0.024	<0.0043	0.023	<0.0043	0.0071	0.042
B-45	0.5	0.050	0.0184	0.007	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	0.015	<0.005	0.0066	<0.005	0.0064	<0.005	0.0068	<0.005	<0.005	0.0099
B-46	0.5	1.293	0.65	0.174	<0.005	0.012	0.013	0.081	0.13	0.083	0.14	0.089	0.12	0.017	0.16	<0.005	0.13	0.0093	0.049	0.26
B-46	5	ND	ND	0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-47	0.5	0.564	0.2886	0.077	<0.005	0.0055	0.0051	0.036	0.057	0.037	0.065	0.039	0.054	0.0076	0.065	<0.005	0.058	<0.005	0.015	0.12
B-47	5	0.097	0.0541	0.015	<0.0047	<0.0047	<0.0047	0.007	0.011	0.008	0.013	0.0071	0.01	<0.0047	0.011	<0.0047	0.011	<0.0047	<0.0047	0.019
B-48	0.5	2.915	1.439	0.392	<0.005	0.033	0.024	0.15	0.29	0.19	0.46	0.18	0.22	0.039	0.3	<0.005	0.37	0.024	0.095	0.54
B-48	5	ND	ND	0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-49	0.5	ND	ND	0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-50	5	2.933	1.586	0.449	<0.0051	0.027	0.018	0.16	0.34	0.21	0.45	0.21	0.24	0.036	0.29	<0.0051	0.39	0.018	0.034	0.51
B-51	0.5	230	122	36	<0.450	1.9	1.9	13	28	17	29	16	19	3	21	<0.450	26	2.2	6.2	46
B-51	1.5	59	28	7.619	<0.050	<0.050	<0.050	2.3	5.6	3.8	10	3.4	3.9	0.75	6.2	<0.050	8.1	0.67	3.1	11
B-51	2.5	4.439	2.3	0.979	<0.005	0.041	0.036	0.28	0.75	0.45	1.2	0.38	0.44	0.079 D	0.67	<0.005	0.910 D	0.042	0.15	1.300 D
B-52	0.5	0.539	0.296	0.076	<0.005	<0.005	0.0062	0.031	0.054	0.044	0.088	0.027	0.063	0.016	0.035	<0.005	0.061	0.0072	0.026	0.081
B-52	1.5	0.041	0.0209	0.008	<0.005	<0.005	<0.005	<0.005	0.0054	<0.005	0.01	<0.005	0.0098	<0.005	<0.005	<0.005	0.0057	<0.005	<0.005	0.0099
B-52	2.5	ND	ND	0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
B-57	0.5	8.854	4.95	1.298	<0.0048	0.062	0.048	0.400	0.930	0.620	2.000	0.540	0.780	0.180	0.520	<0.0048	1.500	0.054	0.250	0.970
B-57	3	0.142	0.0843	0.023	<0.0049	<0.0049	<0.0049	0.0073	0.017	0.012	0.028	0.012	0.014	<0.0049	0.0099	<0.0049	0.022	<0.0049	<0.0049	0.020
B-58	0.5	3.787	2.046	0.604	<0.0041	0.032	0.02	0.17	0.46	0.33	0.62	0.25	0.26	0.046	0.41	<0.0041	0.53	0.02	0.059	0.58
B-59	0.5	0.749	0.486	0.133	<0.0044	0.0056	0.0067	0.056	0.097	0.070	0.120	0.049	0.098	0.030	0.05	<0.0044	0.086	0.0057	0.0024	0.073
B-60	0.5	36.9	19.27	4.791	0.0095	0.290	0.360	2.100	3.400	2.300	5.600	2.700	3.600	0.670	3.900	0.042	4.500	0.360	1.300	5.800
B-60	3	0.101	0.0561	0.014	<0.0048	<0.0048	<0.0048	0.0065	0.0096	0.0067	0.016	0.0083	0.011	<0.0048	0.013	<0.0048	0.014	<0.0048	<0.0048	0.016
B-61	0.5	5.221	2.8	0.653	<0.0049	0.026	0.054	0.310	0.460	0.310	0.780	0.240	0.730	0.130	0.380	0.0058	0.620	0.065	0.530	0.580
B-62	0.5	0.055	0.0364	0.010	<0.0046	<0.0046	<0.0046	0.0061	0.0074	0.0063	0.012	<0.0046	0.011	<0.0046	<0.0046	<0.0046	0.0056	<0.0046	<0.0046	0.0069
B-62	3	2.226	1.72	0.476	<0.0046	0.0072	0.019	0.22	0.350	0.210	0.340	0.150	0.450	0.140	0.140	<0.0046	0.200			
B-63	0.5	61.4	29.74	8.558	<0.025	0.220	0.160	2.500	6.500	3.900	9.300	4.200	4.000	0.540	8.200	<0.025	8.100	0.160	0.660	13.000
B-63	3	3.874	2.154	0.630	<0.0047	0.021	0.011	0.170	0.480	0.290	0.600	0.320	0.260	0.034	0.410	<0.0047	0.600	0.021	0.037	0.620
B-64	0.5	2.909	1.63	0.436	<0.0045	0.019	0.015	0.150	0.320	0.260	0.440	0.220	0.250	0.040	0.310	<0.0045	0.390	0.026	0.069	0.400
B-65	0.5	63.6	32.99	9.063	<0.023	0.610	0.380	2.900	6.700	4.000	12.000	4.500	4.600	0.790	5.900	0.051	9.500	0.490	1.300	9.900

Table 5  
Soil Sampling Results - Polynuclear Aromatic Hydrocarbons, 2003  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

Sample Location	Sample Depth (feet)	Total PAHs	Total cPAHs	B(a)P Equivalence	ACENAPHTHENE	ACENAPHTHYLENE	ANTHRACENE	BENZO(a)ANTHRACENE	BENZO(a)PYRENE	BENZO(b)FLUORANTHENE	BENZO(g,h,i)PERYLENE	BENZO(k)FLUORANTHENE	CHRYSENE	DIBENZ(a,h)ANTHRACENE	FLUORANTHENE	FLUORENE	INDENO(1,2,3-c,d)PYRENE	NAPHTHALENE	PHENANTHRENE	PYRENE
		mg/Kg																		
B-65	3	1.270	0.744	0.210	<0.0046	0.0063	<0.0046	0.066	0.160	0.097	0.190	0.120	0.110	0.011	0.120	<0.0046	0.180	0.0089	0.011	0.190
B-66	0.5	299	159	44	<0.046	2.80	1.80	17.000	33.000	19.000	41.000	23.000	25.000	3.700	35.000	0.270	38.000	1.800	6.700	51.000
B-66	3	1.208	0.645	0.183	<0.0048	0.0088	0.0069	0.065	0.140	0.080	0.160	0.099	0.100	0.011	0.150	<0.0048	0.150	0.0083	0.029	0.200
B-67	0.5	0.837	0.332	0.079	0.03	<0.0045	0.028	0.041	0.056	0.046	0.088	0.03	0.08	0.013	0.096	0.015	0.066	0.013	0.085	0.15
B-68	1	ND	ND	0.003	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041	<0.0041
B-69	0.5	0.259	0.152	0.042	<0.0045	<0.0045	<0.0045	0.014	0.031	0.025	0.047	0.022	0.023	<0.0045	0.018	<0.0045	0.037	<0.0045	0.005	0.037

Notes:  
mg/Kg = milligrams per Kilogram  
ND = Not detected

Table 6  
Annual 2005 Groundwater Sampling Results  
MRP Required and Requested Analyses, and Additional Analyses  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

Well Number	Sample Date	Required Analytes						Requested Analytes							
		Field pH (units)	Nitrate, as N (mg/L)	Arsenic (mg/L)	Sulfide (mg/L)	Sulfate (mg/L)	TDS (mg/L)	Antimony (mg/L)	Barium (mg/L)	Chromium (mg/L)	Chromium (VI) (mg/L)	Iron (mg/L)	Strontium (mg/L)	Calcium (mg/L)	Sodium (mg/L)
Shallow Zone															
Background Well															
M-105	7/14/2005	7.14	10.8	0.0044	< 0.05	30.9	392	0.00007	0.122	0.0043	0.0046	< 0.02	0.697	61.3	45.9
On-site Wells															
M-101	7/18/2005	6.97	14.5	0.0059	< 0.05	333	1290	< 0.00025 N	0.0303	0.0047 N	<0.0005	< 0.02	0.921	104	266
M-102	7/15/2005	9.48	< 1 i,X	0.002	1.25	1530	2700	< 0.00025 N	0.0197	< 0.001 N	<0.0005	< 0.02	0.391	29.7	772
M-103	7/7/2005	8.65	8.0	0.0182	< 0.05	852	1880	0.00679	0.0225	0.0004	0.0006	0.076	0.241	13.5	565
M-104	7/18/2005	11.22	< 2 i,X	0.0522	123	1460	3950	0.00116 N	0.016	<0.001 N	0.0041	0.147	0.0665	5.07	1080
M-106	7/7/2005	11.47	< 0.5 i	0.0873	89	579	3280	0.00062	0.0222	< 0.001	<0.0005	< 0.02	0.0954	2.46	966
M-108	7/6/2005	7.36	2.2	0.0059	< 0.05	481	1040	0.00009	0.0215	0.0013	<0.0005	0.051	0.765	87.7	223
M-108-D	7/6/2005		2.2	0.006	< 0.05	481	1070	0.00009	0.0212	0.0015	<0.0005	0.05	0.748	86	227
M-109	7/15/2005	11.22	< 1 iX	0.103	95	1050	3230	0.00344 N	0.0135	< 0.001 N	<0.0005	0.145	0.0725	3.85	909
M-111	7/15/2005	10.66	< 1 iX	0.0509	103	1360	3410	0.00117 N	0.0138	< 0.001 N	<0.0005	< 0.02	0.144	10.3	990
M-2R	7/7/2005	11.09	< 0.5 i	0.0056	35	533	2150	< 0.00025	0.008	< 0.001	<0.0005	0.0389	0.043	4.14	635
M-6R	7/7/2005	11.69	< 0.5 i	0.0316	58	645	2640	0.00056	0.008	< 0.001	<0.0005	< 0.02	0.0343	2.62	748
M-9R	7/18/2005	7.17	17.8 X	0.0347	< 0.05	171	800	0.00029 N	0.0415	< 0.001 N	<0.0005	< 0.02	0.254	21.3	194
Off-site Wells															
M-113	7/14/2005	6.78	16.6	0.0026	< 0.05	84.7	890	< 0.00005	0.292	0.0055	0.001	0.0811	1.57	124	158
M-119	7/15/2005	9.17	1.7 X	0.0078	0.48	182	1320	< 0.00025 N	0.0248	< 0.001 N	<0.0005	0.0252	0.228	12.3	454
M-121	7/15/2005	6.57	4.9 X	0.0196	< 0.05	62.8	710	< 0.00025 N	0.218	< 0.001 N	<0.0005	0.061	1.47	124	66.4
M-151	7/13/2005	7.57	15.0	0.0057	< 0.05	340	1160	0.00049	0.0593	0.0032	0.0025	< 0.02	0.982	90.8	292
M-152	7/13/2005	7.65	12.4	0.0065	< 0.05	262	870	0.00008	0.0262	0.0019	0.0017	< 0.02	0.421	36.5	246
M-153	7/13/2005	6.79	5.0	0.0034	< 0.05	25.2	604	< 0.00005	0.194	0.0025	0.0026	< 0.02	0.924	70.7	97.6
M-154	7/11/2005	6.41	3.5	0.0032	< 0.05	6.4	424	0.00013	0.109	0.0055	0.0045	0.0627	0.952	86.2	28.8
M-157	7/13/2005	7.2	1.6	0.004	< 0.05	10.8	198	0.00007	0.0342	0.0012	0.001	< 0.02	0.337	30.2	21
M-159	7/13/2005	7.37	12.3	0.0021	< 0.05	68	820	0.00005	0.247	0.0043	0.0043	< 0.02	1.49	127	104
Background (M-105) <sup>(1)</sup>		6.8 - 8.6	11	0.0059	<0.1	46	563	0.0006	---	0.0053	0.0053	<0.020	---	---	---
Deep Zone															
Background Well															
M-118	7/14/2005	7.14	3.0	0.0072	< 0.05	5.6	212	< 0.0001	0.0663	0.0053	0.0056	< 0.02	0.345	30.8	25.3
M-118-D	7/14/2005		3.0	0.0072	< 0.05	5.5	200	< 0.0001	0.0666	0.0054	0.0056	< 0.02	0.348	31.1	25.7
On-site Wells															
M-107	7/6/2005	7.33	3.4	0.0069	< 0.05	24.8	292	0.00009	0.156	0.0047	0.0053	< 0.02	0.502	44.5	30.7
M-150	7/18/2005	7.04	1.6	0.0056	< 0.05	349	716	< 0.00025 N	0.0452	0.0032 N	0.0032	< 0.02	0.963	99.6	71
M-150-D	7/18/2005		1.6	0.0057	< 0.05	349	768	< 0.00025 N	0.0456	0.0032 N	0.0032	< 0.02	0.964	99.6	71.1
M-160	7/12/2005	7.73	2.7	0.0097	0.17	83.2	448	0.00057	0.0839	0.0023	0.0015	0.09	0.433	42.7	89.8
M-161	7/12/2005	7.72	4.8	0.0059	< 0.05	63.4	540	0.00034	0.134	0.0035	0.0029	< 0.02	0.863	76.8	63.8
Off-site Wells															
M-112	7/14/2005	7.2	3.9	0.0056	< 0.05	9.1	234	< 0.0001	0.0732	0.0059	0.0065	< 0.02	0.468	36.9	30.3
M-120	7/15/2005	7.16	2.7 X	0.0068	< 0.05	9.2	308	< 0.00025 N	0.0688	0.0063 N	0.0061	< 0.02	0.413	35.8	29.7
M-155	7/11/2005	7.15	12.6	0.0053	< 0.05	46.9	548	0.00007	0.142	0.004	0.0035	< 0.02	1.04	88.6	53.5
M-156	7/11/2005	7.21	5.7	0.0055	< 0.05	20.7	248	0.00008	0.0744	0.0023	0.0019	< 0.02	0.542	45.3	30
M-158	7/13/2005	7.56	7.9	0.0039	< 0.05	19.0	336	0.00006	0.135	0.002	0.0016	< 0.02	0.829	56.7	40.4
M-162	7/12/2005	7.14	4.7	0.0071	< 0.05	36.6	348	0.00015	0.0168	0.0053	0.0046	< 0.02	0.409	38.8	58.6
M-163	7/12/2005	7.32	0.9	0.0063	< 0.05	702	1240	0.00012	0.0278	0.0032	0.0026	< 0.02	1.24	144	168
City Production Well															
W-8 <sup>(2)</sup>		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Background (M-118) <sup>(1)</sup>		6.5 - 8	3.8	0.0077	<0.1	10.4	286	0.0009	---	0.0084	0.0070	<0.020	---	---	---

**Notes**

Bolded values are greater than calculated background, or greater than the M-105 and M-118 for shallow and deep background respectively, when sufficient data are not available to calculate a statistically-based background concentration.

i = The MRL has been elevated due to a matrix interference.

X = The analysis was performed past the recommended holding time.

NS = Not Sampled

N = The matrix spike recovery is not within control limits. See analytical laboratory case narrative.

mg/L = milligrams per liter

(1) Background ranges represent the 95% UCL for analytical data from 1980 through 2005 in the analytical database for the FMC Modesto site, 1200 Graphics Drive, Modesto, CA.

(2) City well W-8 was removed from service due to Volatile Organic Compound impacts.

D = Duplicate sample submitted for analysis

--- = background concentration not calculated.

Table 6  
Annual 2005 Groundwater Sampling Results  
MRP Required and Requested Analyses, and Additional Analyses  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

Well Number	Sample Date	Additional Analyses			
		Molybdenum (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Shallow Zone					
Background Well					
M-105	7/14/2005	<0.01	<0.00002	0.0398	<0.01
On-site Wells					
M-101	7/18/2005	<0.01	0.00027	0.0306	<0.01
M-102	7/15/2005	0.0133	0.0006	<0.01	<0.01
M-103	7/7/2005	<0.01	<0.00002	0.0518	<0.01
M-104	7/18/2005	0.0364	<0.0001	0.412	<0.01
M-106	7/7/2005	0.0312	<0.0001	0.432	<0.01
M-108	7/6/2005	<0.01	<0.00002	0.0451	0.0157
M-108-D	7/6/2005	<0.01	<0.00002	0.0445	0.0114
M-109	7/15/2005	0.0406	0.0001	0.816	<0.01
M-111	7/15/2005	0.0302	<0.0001	0.0414	<0.01
M-2R	7/7/2005	<0.01	<0.0001	0.0712	<0.01
M-6R	7/7/2005	0.0162	<0.0001	0.617	0.0506
M-9R	7/18/2005	0.0106	0.00042	0.128	<0.01
Off-site Wells					
M-113	7/14/2005	<0.01	<0.00002	0.0301	0.015
M-119	7/15/2005	<0.01	0.00058	<0.01	<0.01
M-121	7/15/2005	<0.01	0.00073	<0.01	<0.01
M-151	7/13/2005	0.0108	<0.00002	0.0308	<0.01
M-152	7/13/2005	<0.01	<0.00002	0.0566	<0.01
M-153	7/13/2005	<0.01	<0.00002	0.0271	<0.01
M-154	7/11/2005	<0.01	<0.00002	0.0355	<0.01
M-157	7/13/2005	<0.01	<0.00002	0.0294	<0.01
M-159	7/13/2005	<0.01	<0.00002	0.0241	<0.01
Background (M-105) <sup>(1)</sup>		---	---	---	---
Deep Zone					
Background Well					
M-118	7/14/2005	<0.01	<0.00004	0.0404	<0.01
M-118-D	7/14/2005	<0.01	<0.00004	0.0398	0.0258
On-site Wells					
M-107	7/6/2005	<0.01	<0.00002	0.0454	0.0626
M-150	7/18/2005	<0.01	<0.0001	0.0285	<0.01
M-150-D	7/18/2005	<0.01	0.00016	0.029	<0.01
M-160	7/12/2005	<0.01	<0.00002	0.0347	<0.01
M-161	7/12/2005	<0.01	<0.00002	0.0323	<0.01
Off-site Wells					
M-112	7/14/2005	0.0103	<0.00004	0.0315	<0.01
M-120	7/15/2005	<0.01	0.00042	0.0321	<0.01
M-155	7/11/2005	<0.01	<0.00002	0.0348	<0.01
M-156	7/11/2005	<0.01	<0.00002	0.0342	<0.01
M-158	7/13/2005	<0.01	<0.00002	0.035	<0.01
M-162	7/12/2005	<0.01	<0.00002	0.0377	<0.01
M-163	7/12/2005	<0.01	<0.00002	0.0215	<0.01
City Production Well					
W-8 <sup>(2)</sup>		NS	NS	NS	NS
Background (M-118) <sup>(1)</sup>		---	---	---	---

Table 7  
Annual 2005 Groundwater Sampling Results - Requested Title 22 Analytes  
FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California

		Dissolved Title 22 Analytes																		
Well Number	Sample Date	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)	Lead (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Strontium (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
Shallow Zone Background Wells																				
M-105	07/14/05	0.00007	0.0044	0.122	< 0.005	< 0.005	0.0043	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.697	< 0.00002	0.0398	< 0.01
On-site Wells																				
M-101	07/18/05	< 0.00025 N	0.0059	0.0303	< 0.005	< 0.005	0.0047 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	0.921	0.00027	0.0306	< 0.01
M-102	07/15/05	< 0.00025 N	0.002	0.0197	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0133	< 0.02	< 0.01	< 0.01	0.391	0.0006	< 0.01	< 0.01
M-103	07/07/05	0.00679	0.0182	0.0225	< 0.005	< 0.005	0.0004	< 0.01	< 0.01	0.076	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.241	< 0.00002	0.0518	< 0.01
M-104	07/18/05	0.00116 N	0.0522	0.016	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	0.147	< 0.05	< 0.0002	0.0364	< 0.02	< 0.01	< 0.01	0.0665	< 0.0001	0.412	< 0.01
M-106	07/07/05	0.00062	0.0873	0.0222	< 0.005	< 0.005	< 0.001	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0312	< 0.02	< 0.005	< 0.01	0.0954	< 0.0001	0.432	< 0.01
M-108	07/06/05	0.00009	0.0059	0.0215	< 0.005	< 0.005	0.0013	< 0.01	< 0.01	0.051	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.765	< 0.00002	0.0451	0.0157
M-108-D	07/06/05	0.00009	0.006	0.0212	< 0.005	< 0.005	0.0015	< 0.01	< 0.01	0.05	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.748	< 0.00002	0.0445	0.0114
M-109	07/15/05	0.00344 N	0.103	0.0135	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	0.145	< 0.05	< 0.0002	0.0406	< 0.02	< 0.01	< 0.01	0.0725	0.0001	0.816	< 0.01
M-111	07/15/05	0.00117 N	0.0509	0.0138	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0302	< 0.02	< 0.01	< 0.01	0.144	< 0.0001	0.0414	< 0.01
M-2R	07/07/05	< 0.00025	0.0056	0.008	< 0.005	< 0.005	< 0.001	< 0.01	< 0.01	0.0389	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.008	< 0.01	0.043	< 0.0001	0.0712	< 0.01
M-6R	07/07/05	0.00056	0.0316	0.008	< 0.005	< 0.005	< 0.001	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0162	< 0.02	< 0.008	< 0.01	0.0343	< 0.0001	0.617	0.0506
M-9R	07/18/05	0.00029 N	0.0347	0.0415	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0106	< 0.02	< 0.01	< 0.01	0.254	0.00042	0.128	< 0.01
Off-site Wells																				
M-113	07/14/05	< 0.00005	0.0026	0.292	< 0.005	< 0.005	0.0055	< 0.01	< 0.01	0.0811	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	1.57	< 0.00002	0.0301	0.015
M-119	07/15/05	< 0.00025 N	0.0078	0.0248	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	0.0252	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	0.228	0.00058	< 0.01	< 0.01
M-121	07/15/05	< 0.00025 N	0.0196	0.218	< 0.005	< 0.005	< 0.001 N	< 0.01	< 0.01	0.061	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	1.47	0.00073	< 0.01	< 0.01
M-151	07/13/05	0.00049	0.0057	0.0593	< 0.005	< 0.005	0.0032	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0108	< 0.02	< 0.005	< 0.01	0.982	< 0.00002	0.0308	< 0.01
M-152	07/13/05	0.00008	0.0065	0.0262	< 0.005	< 0.005	0.0019	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.421	< 0.00002	0.0566	< 0.01
M-153	07/13/05	< 0.00005	0.0034	0.194	< 0.005	< 0.005	0.0025	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.924	< 0.00002	0.0271	< 0.01
M-154	07/11/05	0.00013	0.0032	0.109	< 0.005	< 0.005	0.0055	< 0.01	< 0.01	0.0627	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	0.952	< 0.00002	0.0355	< 0.01
M-157	07/13/05	0.00007	0.004	0.0342	< 0.005	< 0.005	0.0012	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.337	< 0.00002	0.0294	< 0.01
M-159	07/13/05	0.00005	0.0021	0.247	< 0.005	< 0.005	0.0043	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	1.49	< 0.00002	0.0241	< 0.01
Deep Zone Background Well																				
M-118	07/14/05	< 0.0001	0.0072	0.0663	< 0.005	< 0.005	0.0053	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.345	< 0.00004	0.0404	< 0.01
M-118-D	07/14/05	< 0.0001	0.0072	0.0666	< 0.005	< 0.005	0.0054	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.348	< 0.00004	0.0398	0.0258
On-site Wells																				
M-107	07/06/05	0.00009	0.0069	0.156	< 0.005	< 0.005	0.0047	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.502	< 0.00002	0.0454	0.0626
M-150	07/18/05	< 0.00025 N	0.0056	0.0452	< 0.005	< 0.005	0.0032 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	0.963	< 0.0001	0.0285	< 0.01
M-150-D	07/18/05	< 0.00025 N	0.0057	0.0456	< 0.005	< 0.005	0.0032 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	0.964	0.00016	0.029	< 0.01
M-160	07/12/05	0.00057	0.0097	0.0839	< 0.005	< 0.005	0.0023	< 0.01	< 0.01	0.09	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.433	< 0.00002	0.0347	< 0.01
M-161	07/12/05	0.00034	0.0059	0.134	< 0.005	< 0.005	0.0035	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.863	< 0.00002	0.0323	< 0.01
Off-site Wells																				
M-112	07/14/05	< 0.0001	0.0056	0.0732	< 0.005	< 0.005	0.0059	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	0.0103	< 0.02	< 0.005	< 0.01	0.468	< 0.00004	0.0315	< 0.01
M-120	07/15/05	< 0.00025 N	0.0068	0.0688	< 0.005	< 0.005	0.0063 N	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	0.413	0.00042	0.0321	< 0.01
M-155	07/11/05	0.00007	0.0053	0.142	< 0.005	< 0.005	0.004	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	1.04	< 0.00002	0.0348	< 0.01
M-155	07/11/05	0.00007	0.0053	0.142	< 0.005	< 0.005	0.004	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.01	< 0.01	1.04	< 0.00002	0.0348	< 0.01
M-158	07/13/05	0.00006	0.0039	0.135	< 0.005	< 0.005	0.002	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.829	< 0.00002	0.035	< 0.01
M-162	07/12/05	0.00015	0.0071	0.0168	< 0.005	< 0.005	0.0053	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	0.409	< 0.00002	0.0377	< 0.01
M-163	07/12/05	0.00012	0.0063	0.0278	< 0.005	< 0.005	0.0032	< 0.01	< 0.01	< 0.02	< 0.05	< 0.0002	< 0.01	< 0.02	< 0.005	< 0.01	1.24	< 0.00002	0.0215	< 0.01
City Production Well W-8 <sup>(1)</sup>		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Water Quality Goals		0.0028	0.000004	0.49	0.001	0.00007	0.05	0.05	0.17	0.3	0.002	0.0012	0.01	0.012	0.02	0.035	4.2	0.0001	0.05	2
		USEPA IRIS	CA PHG	USEPA IRIS	CA Public Health Goal	CA Public Health Goal	CA Primary MCL	Water Quality for Agriculture	CA Public Health Goal		CA Public Health Goal	CA Public Health Goal	Water Quality for Agriculture	CA Public Health Goal	Water Quality for Agriculture	USEPA IRIS	SNARL	CA Public Health Goal	CA DHS Action Level for Drinking Water	Water Quality for Agriculture

Notes

mg/L = milligrams per liter

NM = Not Sampled

(Duplicate) = Duplicate sample submitted for analysis

N = The matrix spike recovery is not within control limits. See analytical laboratory case narrative.

<sup>(1)</sup> City Well W-8 was removed from service in September 2002 due to Volatile Organic Compound impacts.

**Table 8**  
**Soil Sampling Results**  
**Barium - Total, WET, and TCLP Metals**  
**FMC Corporation**  
**1200 Graphics Drive**  
**Modesto, Stanislaus County, California**

Sampling Location	Sampling Date	Depth (feet)	BARIUM (Total) mg/Kg	BARIUM (WET) mg/L	BARIUM (TCLP) mg/L
B6	5/10/1995	5.0	34300	760	NA
B6	5/10/1995	0.5	36100	2,030	NA
B-72	10/25/2004	0.5-1	5670	44.8	4.7
B-73A	10/25/2004	0.5-1	12500	187	14.1
B-73B	10/25/2004	0.5-1	1330	225	34.7
B-74	10/25/2004	0.5-1	333	17.1	1.9
B-75	10/25/2004	0.5-1	13200	156	59.7
D8	5/8/1995	0.5	85200	693	NA
DGM-2A <sup>1</sup>	5/8/1995	0.5	68600	2,200	NA
E6	5/8/1995	0.5	57000	1,670	NA
SS-2	9/9/1992	0	10000	780	NA

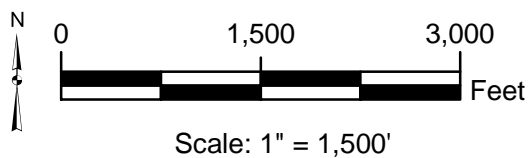
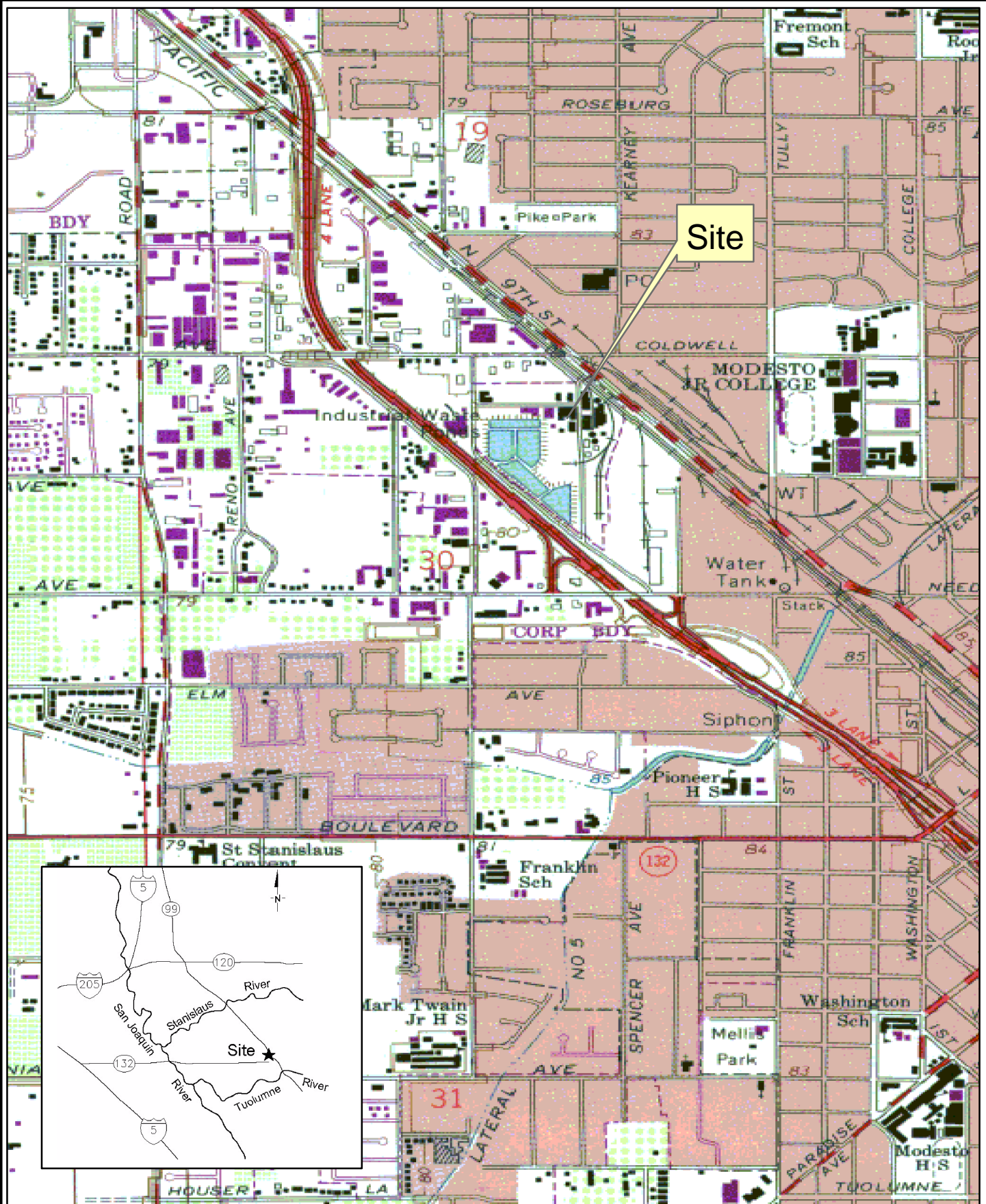
Notes:

mg/L = milligrams per liter


WET = Waste Extraction Test

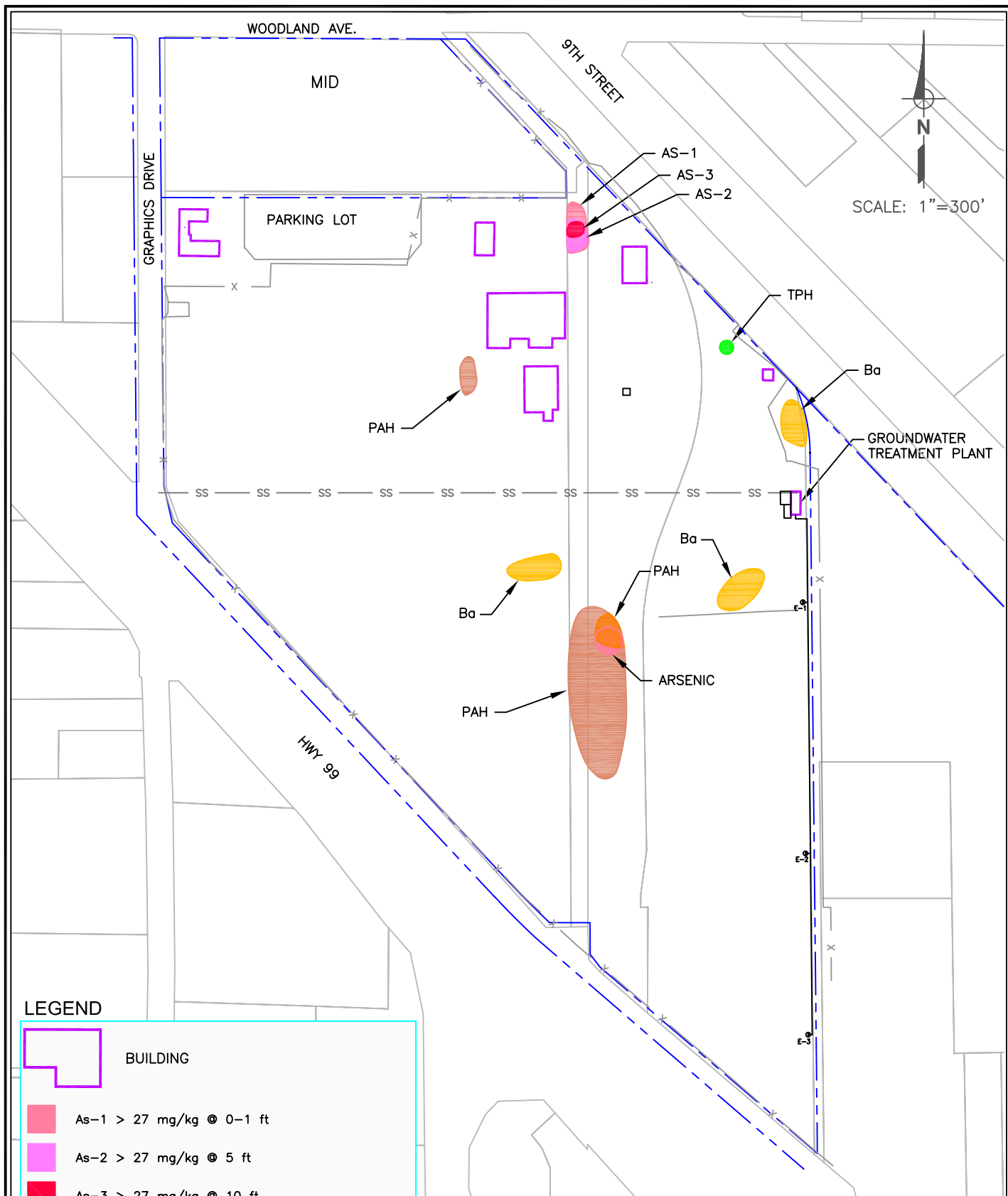
TCLP = Threshold Concentration Leaching Potential

<sup>1</sup> Analytical results presented for DGM-2A are for the composited sample collected from sample locations DGM-2A, DGM-3A, and E-7.



Salida, California Quadrangle  
USGS, 1969 (Rev. 1987) 37121-FI-TF-024

TITLE		Vicinity Map	
LOCATION		FMC Corporation 1200 Graphics Drive Modesto, Stanislaus County, California	
		CHECKED BY	Jennifer Abrahams
		DRAFTED BY	Scott Flory
		FILE	Figure1-1.mxd
		DATE	2/14/2003
FIGURE:			1



# LEGEND

	BUILDING
	As-1 > 27 mg/kg @ 0-1 ft
	As-2 > 27 mg/kg @ 5 ft
	As-3 > 27 mg/kg @ 10 ft
	Ba > 58,000 mg/kg @ 0.5-1 ft
	PAH with B(a)P TEQ > 1.2 mg/kg @ 0-1 ft
	PAH with B(a)P TEQ > 1.2 mg/kg @ 1-2 ft
	TPH > 1,000 mg/kg @ 0.5 ft

bgs - BELOW GROUND SURFACE

TITLE:

## Approximate Areas of Soils with Concentrations Above Heath-Based SSTLs

LOCATION:

FMC Corporation  
1200 Graphics Drive  
Modesto, Stanislaus County, California



GeoTrans, Inc.

CHECKED:	JB
DRAFTED:	MAH
DATE:	10/05

FIGURE:

2

*APPENDIX A*

Site Standard Safety Operating Procedures  
Field Safety Briefing Attendance Sheet

## **SITE SAFETY STANDARD OPERATING PROCEDURES**

To prevent injuries and health effects, the following safe work practices are to be followed when dealing with site hazards. These practices establish a pattern of general precautions and measures for reducing the risks associated with the established scope of work. This list is not inclusive and shall be amended as necessary.

1. Eating, drinking, chewing gum or tobacco, taking medications, and smoking are prohibited in contaminated or potentially contaminated areas, or where the possibility for the transfer of contamination exists.
2. Upon leaving contaminated or suspected contaminated areas, hands and face must be thoroughly washed. A thorough shower and washing must be taken should excessive body contamination occur.
3. Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
4. No beard or facial hair may be worn which interferes with a satisfactory qualitative respirator fit test.
5. Be familiar, knowledgeable, and adhere to all instructions in the Site Health and Safety Plan. A safety meeting shall be held at the start of each project to discuss this plan. Additional meetings shall be held, as necessary to address new or continuing safety and health concerns.
6. Be aware of the location of emergency phone numbers.
7. Personnel going on-site shall be briefed on the anticipated hazards, equipment requirements, safety practices, emergency procedures, and communication methods.
8. Entrance and exit routes should be planned, and emergency escape routes delineated.
9. Unfamiliar operations should be rehearsed prior to implementation.
10. Whenever respiratory protective equipment is in use, the buddy system must be used. Buddies should prearrange hand signals or other means of emergency communication in case of lack of radios or radio breakdown.
11. Visual contact must be maintained between pairs on-site with the team members remaining in close proximity in order to assist each other in case of emergencies.

12. The number of personnel and equipment in the contaminated area should be minimized consistent with site operations.
13. Appropriate work areas should be established for support, contamination reduction, and exclusion areas.
14. Establish appropriate decontamination procedures for leaving the site.
15. Report all injuries or illnesses, unsafe conditions, practices or equipment immediately to the site safety coordinator.
16. A portion of the site "field book" will be maintained as a project safety log. The project safety log will be used to record the names, entry and exit dates, and time of subcontractor personnel, and of project site visitors; air quality and personal exposure monitoring data; and other information related to safety matters. All accidents, illnesses or other incidents shall be reported immediately to the Operations Manager and to the Health and Safety Officer.

**FORM 1**

**FIELD SAFETY BRIEFING ATTENDANCE SHEET**

**Date:** \_\_\_\_\_

**Location:** \_\_\_\_\_

**Presented by:** \_\_\_\_\_

**Topics Covered:**

**HEALTH AND SAFETY PLAN**

- Hazardous/Toxic Substances
- On-Site Organization and Coordination
- Emergency Medical Care and Procedures
- Contingency Plan
- Additional Controls for Complex/Hazardous Jobs

**SPECIFIC PRECAUTIONS FOR DAY'S ACTIVITIES**

**OTHER:** \_\_\_\_\_

**ATTENDEE LIST**

<u>Name (Print)</u>	<u>Company</u>	<u>Signature</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

## APPENDIX B

Heat Stress Effects and Treatment

Cold Stress Effects and Treatment

Spider Bites

Bee Stings

Snake Bites

## **HEAT STRESS EFFECTS AND TREATMENT**

### **1.0 BACKGROUND**

Wearing personal protective equipment, especially during warm weather puts employees at considerable risk of developing heat stress. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress including protective clothing, ambient temperature and humidity, work load and the physical condition of the employee. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs and symptoms and various treatment methods for each form.

### **2.0 EFFECTS AND TREATMENT**

Heat stress is manifested in many forms from mild to severe. This section describes the causes, signs and symptoms and treatment methods for the most common forms of heat stress.

#### **2.1 Heat Cramps**

##### 2.1.1 Causes and Effects

Heat cramps are caused by heavy sweating with inadequate electrolyte replacement. The signs and symptoms of heat cramps include:

- Muscle cramps in legs and abdomen
- Pain accompanying cramps
- Faintness
- Profuse perspiration

##### 2.1.2 Treatment

To provide emergency care for heat cramps, remove the patient to a cool place. Give them sips of liquids such as "Gatorade" or its equivalent. Apply manual pressure to the cramped muscle(s). Remove the patient to a hospital if there is any indication of more severe illness.

#### **2.2 Heat Exhaustion**

##### 2.2.1 Causes and Effects

Heat exhaustion occurs when excessive body heat is transported from the interior of the body to the surface by the blood. The skin vessels become dilated and a large amount of blood is pooled in the skin. This condition, plus the blood pooled in the lower extremities when in an upright

position, may lead to an inadequate return of blood to the heart and eventually to physical collapse. The signs and symptoms of heat exhaustion are as follows:

- Weak pulse
- Rapid and usually shallow breathing
- Generalized weakness
- Pale, clammy skin
- Profuse perspiration
- Dizziness
- Unconsciousness
- Appearance of having fainted (the patient responds to the same treatment administered in cases of fainting)

### 2.2.2 Treatment

To provide emergency care for heat exhaustion, remove the patient to a cool place and remove as much clothing as possible. Administer cool water, "Gatorade" or its equivalent. If possible, fan the patient continually to remove heat by convection, but do not allow chilling or overcooling. Treat the patient for shock, and remove him or her to a medical facility if there is any indication of a more serious problem.

## **2.3 Heat Stroke**

### 2.3.1 Causes and Effects

Heat stroke is a profound disturbance of the heat-regulating mechanism, associated with high fever and collapse. Sometimes this condition results in convulsions, unconsciousness, and even death. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age bear directly on the tendency to heat stroke. It is a serious threat to life and carries a twenty percent mortality rate. The signs and symptoms of heat stroke are as follows:

- Sudden onset
- Dry, hot and flushed skin
- Constricted pupils
- Early loss of consciousness
- Full and fast pulse
- Breathing deep at first, later shallow and even almost absent
- Muscle twitching, growing into convulsions
- Body temperature reaching 105 to 106 °F or higher

### 2.3.2 Treatment

When providing emergency care for heat stroke, remember that this is a true emergency. Transportation to a medical facility should not be delayed. Remove the patient to a cool environment if possible, and remove as much clothing as possible. Assure an open airway. Reduce body temperature promptly by dousing the body with water, or preferably by wrapping in a wet sheet. If

cold packs are available, place them under the arms, around the neck, at the ankles, or any place where blood vessels that lie close to the skin can be cooled. Protect the patient from injury during convulsions, especially from tongue biting.

### 3.0 Prevention of Heat Stress

When working during hot weather conditions, specific steps should be taken to lessen the chances of heat related illnesses. These include:

1. Assure that all employees drink plenty of fluids ("Gatorade" or its equivalent).
2. Assure that frequent breaks are scheduled so overheating does not occur.
3. Revise work schedules, when necessary, to take advantage of the cooler parts of the day (i.e. 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When protective clothing must be worn, especially levels A and B, the suggested guidelines relating ambient temperature and maximum wearing time per excursion are:

<u>Ambient Temperature</u>	<u>Maximum Wearing Time Per Excursion</u>
Above 90° F	15 minutes
85° - 90° F	30 minutes
80° - 85° F	60 minutes
70° - 80° F	90 minutes
60° - 70° F	120 minutes
50° - 60° F	180 minutes

### 4.0 Monitoring

To monitor the level of an employee's heat stress, measure:

Heart Rate - Count the radial pulse during a 30 second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

Oral Temperature - Use a clinical thermometer (three minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6° F (37.6° C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6°F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when oral temperature exceeds 100.6°F (38.1° C).

## COLD STRESS EFFECTS AND TREATMENT

### 1.0 BACKGROUND

As with excessive heat, cold conditions may also present a health risk to employees during field activities. Two factors influence the risk potential for cold stress: temperature and wind speed. The combined effect of temperature and wind can be evaluated by a wind chill index as shown on the chart below. For example, 10°F air temperature and a 15 miles per hour wind combine to create an equivalent still air temperature of -18° F.

Bare flesh and areas of the body which have high surface area to volume ratios such as fingers, toes, and ears are most susceptible to wind chill or extremely low ambient temperatures.

Because cold stress may create the potential for serious injury or death, employees must be familiar with the signs and symptoms and various treatments for each form.

### 2.0 EFFECTS AND TREATMENT

This section describes the causes, signs and symptoms, and treatment methods for the two primary forms of cold stress.

#### 2.1 Frostbite

##### 2.1.1 Causes and Effects

Frostbite is a generic term that describes local injuries from cold. Frostbite occurs when ice crystals form in body tissue, usually the nose, ears, chin, cheeks, fingers, or toes. Frostbite develops in stages. Early on, pain may be felt in the affected area, but later goes away. The area may then feel numb and very cold. The stages and degrees of frostbite damage are as follows:

**Frostnip or Incipient Frostbite** - Skin is blanched or whitened and feels hard on the surface. Underlying tissue still feels soft.

**Moderate Frostbite** - Large blisters may form on the surface and underlying tissues.

**Deep Frostbite** - Tissues are cold, pale, and hard. Tissue damage may be severe.

##### 2.1.2 Treatment

Move person to a warm place. Immerse the frozen part in warm (100° - 105° F) but not hot water. Handle them gently and do not rub or massage. After warming, loosely bandage and seek immediate medical treatment.

## **2.2 Hypothermia**

### **2.2.1 Causes and Effects**

Systemic hypothermia (whole body cooling) is caused by exposure to freezing or rapidly dropping temperature. Several factors increase susceptibility to hypothermia including age (very young or old), smoking, alcoholic beverages, fatigue, and wet clothing. In fact, hypothermia may occur at temperatures well above freezing if the individual has on wet or damp clothing or is immersed in cold water.

The signs and symptoms of hypothermia include:

- shivering (uncontrollable or even violent)
- dizziness
- numbness
- weakness
- impaired judgment
- impaired vision
- drowsiness

The signs and symptoms generally follow five stages:

- 1) Shivering
- 2) Apathy, listlessness, sleepiness
- 3) Loss of consciousness
- 4) Decreased pulse and breathing rate
- 5) Death

### **2.2.2 Treatment**

Move a victim of hypothermia to a warm environment as soon as possible. Remove any wet clothing and redress with loose, dry clothes. Warm, sweet drinks and soups should be provided for internal warming and caloric intake. Do not give food or drink to an unconscious person.

## **3.0 Prevention of Cold Stress**

Exposed skin surfaces should be protected by the use of appropriate cold protective clothing. These protective items can include facemasks, handware, and footwear. Windbreaks can shield the work area from the cooling effects of wind. Employees should wear cold protective clothing appropriate for the level of cold and physical activity with the objective to protect all parts of the body with emphasis on hands and feet. Provisions for keeping the workers hands warm in addition to use of insulated gloves include use of warm air jets and radiant heaters. Adequate insulating clothing to maintain body core temperatures above 36° C should be used.

The use of extra insulating clothing and/or a reduction in the duration of exposure period are special precautions. Wet or damp clothing should be changed as soon as possible. During periods of extreme cold (10°F or less) workers should use the buddy system for constant protective observation.

All work shall cease when conditions create wind chill factors below -35°F unless special precautions have been taken and permission has been received from the Director of Health Sciences.

#### **4.0 Monitoring**

Specific monitoring criteria will not be established for cold stress. However, employees should be thoroughly cognizant of the signs and symptoms of frostbite and hypothermia and adjust work schedules and warm up regimes for temperature and wind conditions.

## Spiders

All spiders are venomous. Fortunately, the most venomous, Black Widows and Brown Recluses, are very shy. Black Widows have a wide distribution in the United States and tend to build their webs in locations where they will not be disturbed. Both will try to avoid human contact. Despite their reclusive habits, they do occasionally bite humans. Recluses, found mainly in the South, will typically bite when they are trapped between flesh and another surface, as when a sleeping human rolls over on a prowling spider, or when putting on clothing or shoes containing spiders.

### Spider Bites

Many spiders are capable of producing mild skin lesions when they bite. If these do not become infected, they usually heal in a short period of time. Many other biting insects, such as fleas, ticks, bedbugs, assassin beetles and others can cause wounds that initially resemble brown recluse spider bites. Please be advised that how or where you store your clothes could create a potential pathway.

When bitten by a Black Widow, a neurotoxin is released that can cause dull pain and cramping in muscles, that can be accompanied by sweating and vomiting. Less than 1% of black widow bites result in death.

Brown recluse bites are different than black widow bites. Brown recluse bites are cytotoxins that cause tissue death or necrosis of the bite area. Often the bite itself is unnoticed. Thirty minutes or an hour after the bite, the person will feel a burning sensation. Within eight hours, a pustule will develop. This infected area can enlarge to the size of a silver dollar. It will become ulcerated and sunken.

### Spider Bite First Aid

- Contact your supervisor.
- Call the Poison Control Center (800-222-1222) for advice. (Not all patients need emergency room treatment, since in some cases the spider does not inject venom)
- Wash the area with soap and water.
- Sanitize the area with hydrogen peroxide or alcohol to prevent infection.
- Apply an ice pack for five to fifteen minutes. Be careful not to freeze the skin.
- Call 911 to summon paramedics if the victim is having an allergic reaction.

### Prevention

Be aware that spiders are not our only predators (e.g. snakes, wasps, bees, etc.). If you are aware that you may be susceptible to any allergic reactions, please inform your supervisor. If necessary, your supervisor can contact me for the purchase of any special first aid equipment.

## Bee Stings

The danger of bee stings:

The two greatest risks from most insect stings are allergic reaction (which occasionally, in some individuals could be fatal) and infection (more common and less serious).

What to do if you are stung:

If you have been stung by a bee, wasp, hornet, or yellow jacket, follow these instructions closely:

- Bees leave behind a stinger attached to a venom sac. Do not try to pull it out as this may release more venom; instead gently scrape it out with a blunt-edged object, such as a credit card or dull knife.
- Wash the area carefully with soap and water. This should be continued several times a day until the skin is healed.
- Apply a cold or ice pack, wrapped in cloth for a few minutes.
- Apply a paste of baking soda and water and leave it on for 15 to 20 minutes.
- Take acetaminophen for pain.

Other remedies for pain and itching may include:

- dabbing on a tiny amount of household ammonia.  
Over-the-counter products which contain ammonia are also available for insect stings.
- taking an over-the-counter antihistamine, if approved by your physician.  
Be sure to follow dosage instructions for children.

When to seek medical attention:

Seek immediate medical attention if you are stung in the mouth or nose as swelling may block airways. Also seek emergency care if any of the following symptoms are present, as these could indicate an allergic reaction:

- large areas of swelling
- abnormal breathing
- tightness in throat or chest
- dizziness
- hives
- fainting
- nausea or vomiting
- persistent pain or swelling

## Snake Bites

The danger of snake bites:

Each year, nearly 8,000 people receive poisonous snake bites in the United States. Even a bite from a so-called "harmless" snake can cause infection or allergic reaction in some people. People who frequent wilderness areas, camp, hike, picnic, or live in snake-inhabited areas should be aware of the potential dangers posed by venomous snakes.

What snakes cause poisonous bites?

Any of the following "pit viper" snakes cause poisonous bites:

- Rattlesnake
- Copperhead
- Cottonmouth Water Moccasin
- Coral Snake

What are the symptoms of poisonous bites?

While each individual may experience symptoms differently, the following are the most common symptoms of poisonous snake bites:

- bloody wound discharge
- fang marks in the skin and swelling at the site of the bite
- severe localized pain
- diarrhea
- burning
- convulsions
- fainting
- dizziness
- weakness
- blurred vision
- excessive sweating
- fever
- increased thirst
- loss of muscle coordination
- nausea and vomiting
- numbness and tingling
- rapid pulse

How are snake bites treated?

Call for emergency assistance immediately if someone has been bitten by a snake. Responding quickly in this type of emergency is crucial. While waiting for emergency assistance:

- Wash the bite with soap and water.
- Immobilize the bitten area and keep it lower than the heart.
- Cover the area with a clean, cool compress or a moist dressing to minimize swelling and discomfort.
- Monitor vital signs.

If a victim is unable to reach medical care within 30 minutes, the American Red Cross recommends:

- Apply a bandage, wrapped two to four inches above the bite, to help slow the venom. This should not cut off the flow of blood from a vein or artery - the band should be loose enough to slip a finger under it.
- A suction device can be placed over the bite to help draw venom out of the wound without making cuts. These devices are often included in commercial snake bite kits.

Most often, physicians use antivenin -- an antidote to snake venom -- to treat serious snake bites. Antivenin is derived from antibodies created in a horse's blood serum when the animal is injected with snake venom. Because antivenin is obtained from horses, snake bite victims sensitive to horse products must be carefully managed.

#### Preventing snake bites:

Some bites, such as those inflicted when you accidentally step on a snake in the woods, are nearly impossible to prevent. However, there are precautions that can reduce your chances of being bitten by a snake. These include:

- Leave snakes alone. Many people are bitten because they try to kill a snake or get too close to it.
- Stay out of tall grass unless you wear thick leather boots and remain on hiking paths as much as possible.
- Keep hands and feet out of areas you cannot see. Do not pick up rocks or firewood unless you are out of a snake's striking distance.
- Be cautious and alert when climbing rocks.

## *APPENDIX C*

Underground Service Alert Notification Instructions  
Damaged Utility Procedures

## **UNDERGROUND SERVICE ALERT NOTIFICATION INSTRUCTIONS**

**1-800-642-2444**

An underground service alert (USA) must be completed at least two business days, and no more than two weeks, prior to any subsurface disturbance (digging, drilling, geoprobing, trenching, etc.)

To complete an underground service alert, do the following:

1. Using white spray-paint or white stakes (with or without flags), mark the location of the drilling/digging/etc.
2. On the edge of the nearest public street, use white spray-paint to delineate the corners of the drilling area, projected to the road. Include arrows on the edges of the corners, label the corner 'USA', and include the approximate distance from the road to the drilling location.
3. Call the USA location request number above, and provide Site information, including site address, nearest cross roads, date of drilling, and other pertinent information.
4. Record the Ticket Number

Following USA notification, you will receive a number of faxes from various utility companies. USA may or may not visit the site to mark utilities. If the drilling (or other) activity is located towards the rear of a property, away from public roads, you may consider hiring a private utility clearance locator in addition to getting USA clearance. USA provides utility clearance from the nearest public street towards the main building at a site (if applicable). USA does not clear utilities between buildings, or on private property.

## **DAMAGED UTILITY PROCEDURES**

If it is determined that a utility has been damaged during operations, proceed with the following steps:

### **Stop Work**

#### **Assess Safety**

- Is anyone seriously hurt? If so, call 911.
- If gas leak, do not start car ignition.
- Clear all persons from the area.

#### **Make Necessary Phone Calls**

- If anyone is hurt, or if you have hit gas or electric, call 911.
- Call the project manager.
- Call the utility. Names and phone numbers are listed below.

#### **Try to locate shutoff valve if the area is safe**

#### **Notify affected property owners if they are apparent**

#### **Identify appropriate contractor to repair the utility**

Service should be restored as soon as possible.

Follow through to ensure repair work is performed to the satisfaction of parties involved.

#### **Modesto Utilities**

<b>Utility</b>	<b>Company/Organization</b>	<b>Phone Number</b>	<b>After Hours Availability</b>
Gas	PG&E	1-800-743-5000, press 2	Yes
Electric	MID (Modesto Irrigation District)	(209) 557-1520	Yes
Water	City of Modesto, O&M, Water Division	(209) 342-2246	Yes
Sewer	City of Modesto	(209) 342-2284	Unknown
Storm Drain	City of Modesto	(209) 342-2284	Unknown
Fire Main	Modesto Fire Department	(209) 572-9590	Yes
Telecom/Fiber Optics	AT&T, Sprint, Cable 1, MCI, Pac Bell, Verizon		

## *APPENDIX D*

Emergency Numbers, Map, and Written Directions to Hospital

## ROUTE TO HOSPITAL

Doctor's Medical Center  
1441 Florida Avenue  
Modesto, California  
(209) 578-1211

### Driving Directions:

1. Start at 1200 GRAPHICS DR, MODESTO - go < 0.1 mi
2. Turn **R** on WOODLAND AVE - go 0.1 mi
3. WOODLAND AVE becomes COLDWELL AVE - go 0.4 mi
4. Turn **L** on TULLY RD - go 0.8 mi
5. Turn **R** on W ORANGEBURG AVE - go 0.9 mi
6. Turn **L** on FLORIDA AVE - go 0.1 mi
7. Arrive at 1441 FLORIDA AVE, MODESTO, on the **L**



## **Appendix B**

**SJVUAPCD Rule 8021 –  
Construction, Demolition, Excavation, Extraction,  
and Other Earthmoving Activities  
(Adopted November 15, 2001; Amended August 19, 2004)**

RULE 8021 CONSTRUCTION, DEMOLITION, EXCAVATION, EXTRACTION, AND  
OTHER EARTHMOVING ACTIVITIES (Adopted November 15, 2001;  
Amended August 19, 2004)

1.0 Purpose

The purpose of this rule is to limit fugitive dust emissions from construction, demolition, excavation, extraction, and other earthmoving activities.

2.0 Applicability

This rule applies to any construction, demolition, excavation, extraction, and other earthmoving activities, including, but not limited to, land clearing, grubbing, scraping, travel on site, and travel on access roads to and from the site. This rule also applies to the construction of new landfill disposal sites or modification to existing landfill disposal sites prior to commencement of landfilling activities. The provisions of this rule adopted on November 15, 2001 shall remain in effect until October 1, 2004 at which time the amendments adopted on August 19, 2004 shall take effect.

3.0 Definitions

The definitions of terms in Rule 8011 (General Requirements) shall apply to this rule.

4.0 Exemptions

In addition to the exemptions established in Rule 8011, the activities listed in Sections 4.1 through 4.5 are exempt from this rule. However, carryout and trackout materials as a result of activities exempted in Sections 4.1 through 4.5 of this rule must be removed from any paved public roads pursuant to Rule 8041 (Carryout and Trackout):

- 4.1 Blasting activities that have been permitted by the California Division of Industrial Safety. Other activities performed in conjunction with blasting are not exempt from complying with the provisions of other applicable rules under Regulation VIII (Fugitive PM10 Prohibitions).
- 4.2 Maintenance or remodeling of existing buildings and additions to existing buildings where total building area is not increased by more than fifty percent, or 10,000 square feet, whichever is less; but not including ancillary construction such as expanding parking lots.
- 4.3 All additions to existing single family residential buildings.
- 4.4 Disking of weeds and dried vegetation related to fire prevention required by a Federal, State or local agency on a site less than one-half (½) acre. Activities

performed in conjunction with disking are not exempt from complying with the provisions of other applicable rules under Regulation VIII.

- 4.5 The spreading of landfill daily cover necessary to cover garbage/rubbish in order to preserve public health and safety and to comply with the requirements of the California Integrated Waste Management Board during wind conditions which would generate fugitive dust.

## 5.0 Requirements

No person shall perform any construction, demolition, excavation, extraction, or other earthmoving activities unless the appropriate requirements in sections 5.1 through 5.5 are sufficiently implemented to limit VDE to 20% opacity and comply with the conditions for a stabilized surface area when applicable. In addition to the requirements of this rule, a person shall comply with all other applicable requirements of Regulation VIII.

- 5.1 A person shall implement the requirements specified below when using wrecking balls or other wrecking equipment to raze or demolish buildings.
  - 5.1.1 Apply sufficient water to building exterior surfaces, unpaved surface areas where equipment will operate, and razed building materials to limit VDE to 20% opacity throughout the duration of razing and demolition activities.
  - 5.1.2 Apply sufficient dust suppressants to unpaved surface areas within 100 feet where materials from razing or demolition activities will fall in order to limit VDE to 20% opacity.
  - 5.1.3 Apply sufficient dust suppressants to unpaved surface areas where wrecking or hauling equipment will be operated in order to limit VDE to 20% opacity
  - 5.1.4 Handling, storage, and transport of bulk materials on-site or off-site resulting from the demolition or razing of buildings shall comply with the requirements specified in Rule 8031 (Bulk Materials)
  - 5.1.5 Apply water within 1 hour of demolition to unpaved surfaces within 100 feet of the demolished structure.
  - 5.1.6 Prevention and removal of carryout or trackout on paved public access roads from demolition operations shall be performed in accordance with Rule 8041 (Carryout and Trackout).
- 5.2 A person shall control the fugitive dust emissions to meet the requirements in Table 8021-1.

Table 8021-1 – CONTROL MEASURE OPTIONS FOR  
CONSTRUCTION, EXCAVATION, EXTRACTION, AND  
OTHER EARTHMOVING ACTIVITIES

A.	PRE-ACTIVITY: A1 Pre-water site sufficient to limit VDE to 20% opacity, and A2 Phase work to reduce the amount of disturbed surface area at any one time.
B.	DURING ACTIVE OPERATIONS: B1 Apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity; or B2 Construct and maintain wind barriers sufficient to limit VDE to 20% opacity. If utilizing wind barriers, control measure B1 above shall also be implemented. B3 Apply water or chemical/organic stabilizers/suppressants to unpaved haul/access roads and unpaved vehicle/equipment traffic areas sufficient to limit VDE to 20% opacity and meet the conditions of a stabilized unpaved road surface.
C.	TEMPORARY STABILIZATION DURING PERIODS OF INACTIVITY: C1 Restrict vehicular access to the area; and C2 Apply water or chemical/organic stabilizers/suppressants, sufficient to comply with the conditions of a stabilized surface. If an area having 0.5 acres or more of disturbed surface area remains unused for seven or more days, the area must comply with the conditions for a stabilized surface area as defined in section 3.58 of Rule 8011.

### 5.3 Speed Limitations and Posting of Speed Limit Signs on Uncontrolled Unpaved Access/Haul Roads on Construction Sites

5.3.1. An owner/operator shall limit the speed of vehicles traveling on uncontrolled unpaved access/haul roads within construction sites to a maximum of 15 miles per hour.

5.3.2. An owner/operator shall post speed limit signs that meet State and Federal Department of Transportation standards at each construction site's uncontrolled unpaved access/haul road entrance. At a minimum, speed limit signs shall also be posted at least every 500 feet and shall be readable in both directions of travel along uncontrolled unpaved access/haul roads.

### 5.4 Wind Generated Fugitive Dust Requirements

5.4.1 Cease outdoor construction, excavation, extraction, and other earthmoving activities that disturb the soil whenever VDE exceeds 20% opacity. Indoor activities such as electrical, plumbing, dry wall installation, painting, and any other activity that does not cause any disturbances to the soil are not subject to this requirement.

- 5.4.2 Continue operation of water trucks/devices when outdoor construction excavation, extraction, and other earthmoving activities cease, unless unsafe to do so.

## 6.0 Administrative Requirements

### 6.1 Test Methods

The applicable test methods specified in Rule 8011 shall be used to determine compliance with this rule.

### 6.2 Recordkeeping

An owner/operator shall comply with the recordkeeping requirements specified in Rule 8011.

### 6.3 Dust Control Plan

6.3.1 An owner/operator shall submit a Dust Control Plan to the APCO prior to the start of any construction activity on any site that will include 10 acres or more of disturbed surface area for residential developments, or 5 acres or more of disturbed surface area for non-residential development, or will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least three days. Construction activities shall not commence until the APCO has approved or conditionally approved the Dust Control Plan. An owner/operator shall provide written notification to the APCO within 10 days prior to the commencement of earthmoving activities via fax or mail. The requirement to submit a dust control plan shall apply to all such activities conducted for residential and non-residential (e.g., commercial, industrial, or institutional) purposes or conducted by any governmental entity.

6.3.2 An owner/operator may submit one Dust Control Plan covering multiple projects at different sites where construction will commence within the next 12 months provided the plan includes each project size and location, types of activities to be performed. The Dust Control Plan shall specify the expected start and completion date of each project.

6.3.3 The Dust Control Plan shall describe all fugitive dust control measures to be implemented before, during, and after any dust generating activity.

- 6.3.4 A Dust Control Plan shall contain all the information described in Section 6.3.6 of this rule. The APCO shall approve, disapprove, or conditionally approve the Dust Control Plan within 30 days of plan submittal. A Dust Control Plan is deemed automatically approved if, after 30 days following receipt by the District, the District does not provide any comments to the owner/operator regarding the Dust Control Plan.
- 6.3.5 An owner/operator shall retain a copy of an approved Dust Control Plan at the project site. The approved Dust Control Plan shall remain valid until the termination of all dust generating activities. Failure to comply with the provisions of an approved Dust Control Plan is deemed to be a violation of this rule. Regardless of whether an approved Dust Control Plan is in place or not, or even when the owner/operator responsible for the plan is complying with an approved Dust Control Plan, the owner/operator is still subject to comply with all requirements of the applicable rules under Regulation VIII at all times.
- 6.3.6 A Dust Control Plan shall contain all of the following information:
- 6.3.6.1 Name(s), address(es), and phone number(s) of person(s) and owner(s)/operator(s) responsible for the preparation, submittal, and implementation of the Dust Control Plan and responsible for the dust generating operation and the application of dust control measures.
  - 6.3.6.2 A plot plan which shows the type and location of each project.
  - 6.3.6.3 The total area of land surface to be disturbed, daily throughput volume of earthmoving in cubic yards, and total area in acres of the entire project site.
  - 6.3.6.4 The expected start and completion dates of dust generating and soil disturbance activities to be performed on the site.
  - 6.3.6.5 The actual and potential sources of fugitive dust emissions on the site and the location of bulk material handling and storage areas, paved and unpaved roads; entrances and exits where carryout/trackout may occur; and traffic areas.
  - 6.3.6.6 Dust suppressants to be applied, including: product specifications; manufacturer's usage instructions (method, frequency, and intensity of application); type, number, and

capacity of application equipment; and information on environmental impacts and approvals or certifications related to appropriate and safe use for ground application.

6.3.6.7 Specific surface treatment(s) and/or control measures utilized to control material carryout, trackout, and sedimentation where unpaved and/or access points join paved public access roads.

6.3.6.8 At least one key individual representing the owner/operator or any person who prepares a Dust Control Plan must complete a Dust Control Training Class conducted by the District. The District will conduct Dust Control Training Classes on an as needed basis.

#### 6.4 District Notification of Earthmoving Activities on Smaller Construction Sites

6.4.1 On residential development construction sites ranging from 1.0 to less than 10.0 acres in area, an owner/operator shall provide written notification to the District at least 48 hours prior to his/her intent to commence any earthmoving activities.

6.4.2 On non-residential development construction sites ranging from 1.0 to less than 5.0 acres in area, an owner/operator shall provide written notification to the District at least 48 hours prior to his/her intent to commence any earthmoving activities.